PATENT ABSTRACTS OF JAPAN

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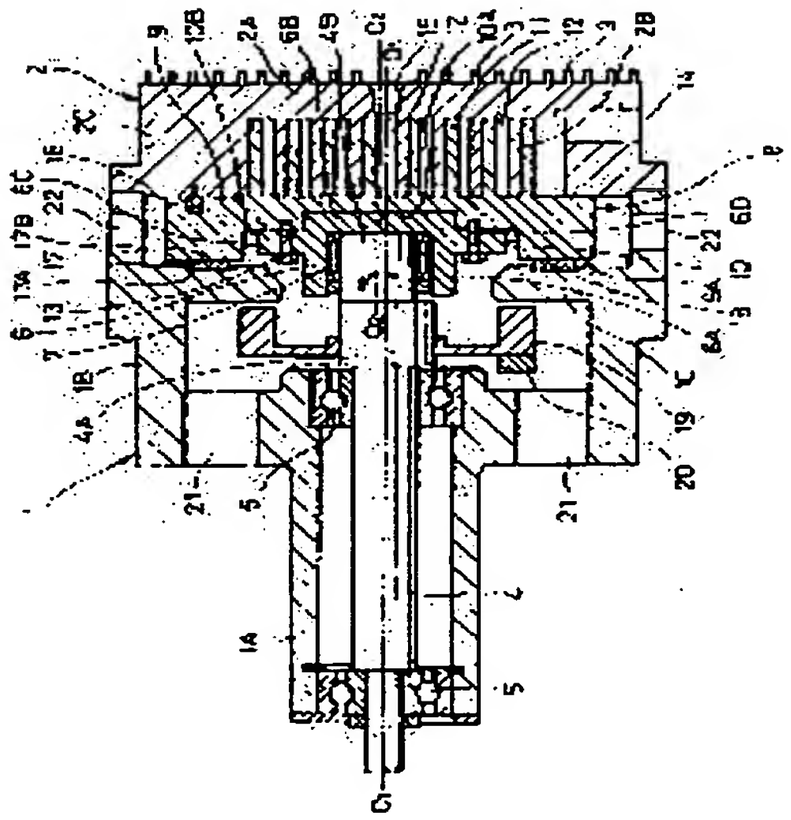
(54) SCROLL TYPE FLUID MACHINERY

(57)Abstract:

PURPOSE: To obtain a lightweight captioned machinery by making at least one among a swirl scroll and a thrust slide bearing for supporting said scroll from aluminium material and making the other from the high performance engineering plastic and forming an oxidized film on the slide contact surface of the aluminium material.

CONSTITUTION: A turning scroll 8 having a spiral lap part 11 meshed with the spiral lap part 2B of a fixed scroll 2 is made of aluminium material, and a fitting recessed part 10 is formed on one side of a mirror plate 9. A boss member 6 is fitted into the small-diameter recessed part 10a of the fitting recessed part 10, and a flange 6 is fixed by bolts 13.... A slide bearing 17 is brought into slide contact with an annular slide contact surface 9A on the outside of the fitting recessed part 10 on one side of the mirror plate 9, and said slide contact surface 9A is applied with the hardening treatment for forming an oxidized film. Further, the slide bearing 17 is prepared from the high performance engineering plastic which possesses the heat resistance, abrasion resistance with high load, and the superior sliding performance.



Japanese Patent Application Laid-open 06-317271

[Claim(s)]
[Claim 1]In a well-closed container, form successively and store a scroll compressor and an electric motor via the axis of rotation supported movably on a frame, divide a well-closed container room in an up-and-down room, and said scroll compressor, Engage a fixed scroll and a turning scroll and a backpressure chamber of panel regions of back of said turning scroll is equipped with an Oldham mechanism between a frame and a panel of said turning scroll, Said fixed pivot receiving part and said main bearing part are arranged so that driving force which acts on a fixed pivot receiving part and a main bearing part by the side of a frame may be come on the same flat surface right-angled to a crankshaft, It engages with an eccentric shaft part which forms said turning scrolls successively to said crankshaft, In a sealed type scroll compressor which makes it circle to said fixed scroll, without rotating said turning scroll, makes it move centering on compression space formed by both scrollings, decrease in number capacity, and compresses gas, Form in a shank lower end part of a revolution boss section an oil supply groove extended to a diameter direction, and supply said fixed pivot receiving part with oil in a centrifugal pump operation or a viscosity-pump operation, and establish a parallel groove where a channel depth is shallow in a shaft outer edge section in shaft orientations, and an oil supply resistance part is formed in a main bearing part by the side of said frame by said parallel groove, A sealed type scroll compressor making said frame side shaft receiving part supply with oil by differential pressure of a discharge pressure and low pressure of the downstream.
[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the sealed type scroll compressor used as compressors for refrigerants for [for frozen air conditioning] - refrigerators, etc.
[0002]
[Description of the Prior Art]A scroll compressor as indicated by JP,56-126691,A and JP,60-187789,A, A fixed pivot receiving part and a main bearing part are arranged so that the driving force which acts on a fixed pivot receiving part and the main bearing part by the side of a frame may

be come on the same flat surface right-angled to a crankshaft, It engages with the eccentric shaft part which forms turning scrolls successively to a crankshaft, and could be made to make small bearing load which acts on a both-bearings part to the minimum by composition which made it circle to a fixed scroll without rotating a turning scroll.

[0003]

[Problem(s) to be Solved by the Invention]In JP,56-126691,A, although there was an effect as for which bearing load of a compressor is made to the minimum, there is no concrete indication in the lubricating method (the supplying [with oil] method) of the both-bearings part of a fixed pivot receiving part and the main bearing part by the side of a frame, and the technical problem occurred in respect of the reliability of a compressor. On the other hand, in JP,60-187789,A, it is the structure where only the centrifugal pump operation by the eccentric hole within a driving shaft performs oil supply to a both-bearings part. For this reason, in the case of low speed driving, the amounts of oil supply to a both-bearings part run short due to the extreme fall of a centrifugal pump operation especially. If drive frequency of a compressor is high-velocity-revolution-ized from 150 Hz to 180 Hz etc., in JP,56-126691,A, the field of the cooling method of a bearing part will also be combined and the performance of a compressor will fall notably. Thus, in two conventional technologies, the performance of a compressor falls notably by the wide operating range of a low-speed area and a high speed area.

[0004]

[Means for Solving the Problem]In a sealed type scroll compressor which has arranged said fixed pivot receiving part and a main bearing part so that driving force which acts on a fixed pivot receiving part and a main bearing part by the side of a frame may be come on the same flat surface right-angled to a crankshaft, Equip an outer edge section of an upper bed side of a crankshaft eccentric shaft part with a seal part, and a lubricating oil storage part which made an upper bed side and a lower end surface of said eccentric shaft part atmosphere of a discharge pressure is constituted, Form in a shank lower end part of said revolution boss section an oil supply groove extended to a diameter direction, supply a fixed pivot receiving part with oil, and, on the other hand, in a centrifugal pump operation or a viscosity-pump operation to a main bearing part by the side of a frame.

A parallel groove where a channel depth is shallow is established in shaft orientations in a shaft outer edge section, an oil supply resistance part is formed by said parallel groove, and it is considered as lubrication structure which said frame side shaft receiving part was made to refuel by differential pressure of a discharge pressure and low pressure of the downstream. Arrange said fixed pivot receiving part and a main bearing part to come driving force which acts on a fixed pivot receiving part and a main bearing part by the side of a frame on the same flat surface right-angled to a crankshaft, and consider it as a size which extended shaft length of a fixed pivot receiving part from shaft length of a main bearing part. An outer edge section of an upper bed side of a crankshaft eccentric shaft part is equipped with a seal part, and drain oil structure which considered a suction pipe and a back room as composition which was open for free passage via a converging section so that it might become the low pressure region which made a back part of a panel peripheral part of said turning scroll which serves as an outside area from said seal part atmosphere of suction pressure is established. Or in order to make into atmosphere of an intermediate pressure of suction pressure and a discharge pressure a back part of a panel peripheral part of said turning scroll which serves as an outside area from said seal part, a back room was opened for free passage via a converging section the suction-pipe side.

[0005]

[Function]An operation of this invention is explained based on drawing 3 from drawing 1. The fixed pivot receiving part 31 and the main bearing part 32 of a turning scroll are arranged, and since the main bearing part by the side of a frame mainly has composition by differential pressure oil supply, an oil is easily led to the oil sac 13c of the lower end part of the fixed pivot receiving part 31 to the position of the oil sac 13c. For this reason, oil quantity sufficient also in a centrifugal pump operation is [oil supply of a fixed pivot receiving part] securable by forming in the shank lower end part of a revolution boss section the oil supply groove extended to a diameter direction. The planar pressure fall of the fixed pivot receiving part 31 can be aimed at by having made shaft length L2 of the fixed pivot receiving part 31 longer than the shaft length L1 of the main bearing part 32. The fixed pivot receiving part used as the part where the value of the number of ZOMMA felt from which this serves as bearing

performance values, such as a value of planar pressure, is the severest is improved.

[0006]Drawing 2 is a fragmentary sectional view showing the pattern of the flow of the surrounding oil of the seal ring part 45. The very small crevice 45a is formed in the upper and lower sides of the seal ring part 45, and the seal of the portion is carried out with an oil. In shaft orientations, since 14f and 14m are the atmosphere of the same pressure, unnecessary thrust force does not act on the crankshaft 14, and the inside of the seal ring part 45 which is 15f of upper bed sides constitutes the lubricating oil reservoir 46. By making a discharge pressure act on the upper bed side of the crankshaft eccentric shaft part of this composition, the suitable forcing means for the fixed scroll 5 side can be easily obtained for the back part of the panel peripheral part of the turning scroll 6. This can take a larger operating pressure ratio to a conventional machine, and its user-friendliness nature improves. Displacement (action) in the shaft orientations of a turning scroll also stabilizes a large operating pressure ratio, and the sliding loss in the panel side of both scrollings is also reduced. By establishing the lubrication structure and drain oil structure of this invention, the oil supplied to the bearing part can be made to discharge smoothly continuously to the compression operating chamber side including the backpressure chamber side and by extension, an inhalatorium thoroughly, and lubrication performance -- cooling by the bearing parts 31 and 32 is promoted -- is improved. By sharp reduction of bearing load, especially the performance of the compressor in a high speed area improves conjointly with this effect.

[0007]

[Example]The example of this invention is shown ranging from drawing 1 to drawing 9. Overall explanation of the scroll compressor concerning introduction and one example of this invention is given by drawing 4. In drawing 4, the electric motor part 3 is caudad stored for the compressor part 100 above [in the well-closed container 1]. And the inside of the well-closed container 1 is divided in the upper chamber 1a (regurgitation room) and the electric cabins 1b and 1c.

[0008]The compressor part 100 engages the fixed scroll member 5 and the swing scroll member 6 of each other, and forms the compression space (closed space) 7. The fixed scroll member 5 consisted of the disc-like panel 5a

and the lap 5b which stood straight to this and was formed in the involute curve or the curve of approximation in this, and the central part is equipped with the delivery 10, and it equips the peripheral part with the admission port 16. The swing scroll member 6 consists of the lap of a fixed scroll, the lap 6b formed in identical shape, and the boss 6C formed in the anti-lap face of a panel by standing straight to this with the disc-like panel 6a. It has composition which maintained the infinitesimal gap between the pedestal surface 11e of the frame 11 and the panel 5a of a fixed scroll which fix the fixed scroll 5, and put the panel peripheral part 6a of the turning scroll to it. In this example, improvement in the speed of the compressor is attained at the material of the turning scroll 6 using aluminum containing alloy system material using cast iron system material to the fixed scroll member 5. It is considered as the structure which has arranged the fixed pivot receiving part 31 and the main bearing part 32 so that it may become the crankshaft 14a on the same right-angled flat surface about the driving force which acts on the fixed pivot receiving part 31 and the main bearing part 32 by the side of the frame 11, and it is engaging with the eccentric shaft part 14b which forms turning scrolls successively to the crankshaft 14. The frame 11 forms the bearing part 32 in a center section, and the axis of rotation 14 is supported movably by this bearing part. The fixed scroll member 5 is fixed to the frame 11 with two or more bolts, The swing scroll member 6 is supported movably by the frame 11 according to Oldham mechanism 12 which consists of an Oldham ring and ORUDAMUKI, and the swing scroll member 6 is formed so that it may circle to the fixed scroll member 5 without rotating. The electric devices 14c fixed to the lower part by the rotor 3b were formed successively to one, and the electric motor part 3 is directly linked with the axis of rotation 14. The well-closed container 1 is penetrated in the admission port 16 of the fixed scroll member 5, the vertical suction pipe 17 is connected, and the delivery 10 is opening for free passage the upper chamber 1a which is carrying out the opening with the top electric cabin 1b via the passages 18a and 18b. Besides, the part electric room 1b is open for free passage to the lower electric cabin 1c via the passage 19 between the electric motor stator 3a and well-closed container 1 side attachment wall. The top electric cabin 1b is open for free passage to the discharge tube 20 which penetrates the well-closed container 1. 33 is a lower-shaft receiving part.

34 is a thrust pad.
The thrust pad 34 is provided with the receptacle function supporting the axis 14. 33a and 33b are housing which supports the bearing 33.
[0009]22 shows the oil sump of a well-closed container pars basilaris ossis occipitalis. A figure inner substance line arrow shows the flow direction of a refrigerant gas, and a dashed line arrow shows the flow direction of an oil. 8 and 29 are the first for offsetting the centrifugal force accompanying the circular movement of the turning scroll 6, and the second balance weight.
[0010]Next, it explains that a lubricating oil flows.
[0011]The lubricating oil 22a is accumulated in the lower part of the well-closed container 1 as the oil sump 22. The central longitudinal hole 13 for performing oil supply to each bearing part is formed in the axis of rotation 14 from the lower end of the axis of rotation 14 to the lower end surface of the revolution boss 6C. 13a is an oil pumping pipe which puts the lower end and the pars-basilaris-ossis-occipitalis oil sump 22 of the axis of rotation 14 in a row. The lower end of the oil pumping pipe 13a immersed in the oil sump 22 of the lubricating oil 22a has received high-pressure discharge-pressure Pd, and, on the other hand, the periphery by the side of the drain oil of the main guide bearing 32 used as the lower stream, Since the fine pores 6d and 6e (refer to drawing 10) provided in the revolution panel 6a have received intermediate-pressure Pm which is a pressure in the middle of compression, the lubricating oil 22a in the oil sump 22 of a container bottom goes up the inside of the central longitudinal hole 13 according to the pressure differential of Pd and Pm.
[0012]Next, drawing 3 explains the structure of the bearing part circumference from drawing 1. In drawing 1, the outer edge section of 14 f of upper bed sides of the crankshaft eccentric shaft part 14b is equipped with the seal ring part 45, and 14 f of upper bed sides and 14 m of lower end surfaces were made into the atmosphere of discharge-pressure Pd. The fixed pivot receiving part 31 and the main bearing part 32 are arranged, shaft length L2 of the fixed pivot receiving part 31 is made longer than the shaft length L1 of the main bearing part 32, and the planar pressure fall of the fixed pivot receiving part 31 is aimed at. This is for aiming at the improvement of the fixed pivot receiving part used as the part where the value of the number of ZOMMA felt used as bearing performance values,

such as a value of planar pressure, is the severest. I will become a size before and behind L2/L1=1.2-1.5 practical.

[0013]Drawing 2 is a fragmentary sectional view showing the pattern of the flow of the oil of the seal ring part 45 circumference. The very small crevice 45a is formed in the upper and lower sides of the seal ring part 45, and the seal of the portion is carried out with an oil. Thrust force unnecessary to shaft orientations does not act on the crankshaft 14, and the inside of the seal ring part 45 which is 15f of upper bed sides constitutes the lubricating oil reservoir 46. By making a discharge pressure act on the upper bed side of a crankshaft eccentric shaft part, the suitable forcing means for the fixed scroll 5 side can be easily obtained for the back part of the panel peripheral part of the turning scroll 6. In order to make into the atmosphere of the intermediate pressure of suction pressure and a discharge pressure the back part of the panel peripheral part of the turning scroll 6 which serves as an outside area from the seal part 45, the back room 50 is opened for free passage via the converging section (passage) 53 the suction-pipe 17 side. The converging section (passage) 53 serves as a passage of the lubricating oil 22a which flowed out from the bearing parts 31 and 32 out of which it escapes from and comes. Thus, cooling action ****** of a bearing part raises a lubrication action by providing a drain oil passage properly. Drawing 3 is what equipped the outer edge section of 14 f of upper bed sides of a crankshaft eccentric shaft part with the seal means 14p, A seal part has the back part and the very small crevice 45a between the turning scroll panels 6a, The height 14P constitutes, and the suction pipe 17 and the back room 50 are considered as the composition which was open for free passage via the converging section (passage) 54 so that it may become the low pressure region which made the back part of the panel peripheral part of the turning scroll which serves as an outside area from this the atmosphere of suction pressure. As shown in drawing 3, a converging section (passage) may form the fine pores 55 radiate inside the panel 6a of the turning scroll 6 so that the function as a drain oil passage may be given. As shown in drawing 1, the inside diameter Dsi size of an inhalatorium and the inside of the seal ring part 45 of 14 f of upper bed sides the relation with the outside Dbo size of the field (field of discharge-pressure Pd) of the lubricating oil reservoir 46, In order to take a larger operating pressure ratio to a

conventional machine, Dbo/Dsi=0.4-0.6 order will become an appropriate value practical. It is a Dbo/Dsi ratio 0.6 by setting up more greatly order, A holes [which were shown by drawing 10 / for a diaphragm / 6e and 6d] position is located more in lap peripheral parts (for example, position of a lap rim end to the 0.5 volume inside, etc.), and the pressure of ** 50 by the side of the back of the revolution panel 6a can be set as the pressure of the low-tension side rather than close to suction pressure. By considering it as such a hole location, it is Pd/Ps=1.2. It depends when as order and a operating range in a low operating pressure ratio spreads.

[0014]Drawing 5 is a fragmentary sectional view showing the example of the fixed pivot receiving part 31 circumference. In the composition which has arranged the fixed pivot receiving part 31 and the main bearing part 32 so that it may become the crankshaft 14 on the same right-angled flat surface about the driving force which acts on the main bearing part by the side of the frame 11, 6 f of oil supply grooves extended in the shank lower end part of the revolution boss section 6C in a diameter direction are formed, and a fixed pivot receiving part is supplied with oil in a centrifugal pump operation. The outer edge section of 6 f of oil supply grooves is connected with this and the ring groove part 38c (a circumference groove part is formed) provided in the inner periphery of the fixed pivot receiving part which counters. The ring groove part 38c is engaging with the flat-surface cut part 38 as shown in 6 m of spiral slots (thread groove) or drawing 7 provided in the peripheral part of the boss section 6C. The amount of oil supply in a bearing part is secured in a viscosity-pump operation by the circular movement etc. of 6 m of spiral slots (thread groove) established in the peripheral part of the boss section 6C. On the other hand, as shown in drawing 7, the parallel groove 32a where a channel depth is shallow is established in shaft orientations in the outer edge section of the shaft 14a, and the oil supply resistance part is formed in the main bearing part 32 by the side of the frame 11 by the parallel groove 32a where a channel depth is shallow. It is considered as the structure which made the frame side shaft receiving part supply with oil by the differential pressure of a discharge pressure and the low pressure of the downstream, and adjusted the amount of oil supply.

[0015]Thus, the lubricating oil 22a which went up the inside of the central longitudinal hole 13 is refueled to the main guide bearing 32 and the turning

bearing 31. It mixes with a refrigerant gas and the oil which the oil refueled to each bearings 31 and 32 flowed into the backpressure chamber 50, and flowed into the backpressure chamber 50 flows in the frame room 11f which is the flank space of the circumference of the panel peripheral part of a turning scroll. The oil collected on the frame room 11f flows into 5 f of inhalatoriums, and the compression space 7 via 6d of back pressure holes, or the communicating paths (converging section) 54 and 58. The oil which resulted in the compression space 7 is pressurized with a refrigerant gas, and moves to the upper regurgitation room 1a pan of the fixed scroll 5 to the electric cabin 1b. A refrigerant gas and an oil are separated in this electric cabin 1b and the downward space 1c, and an oil falls to the oil sump 22 of the lower part of the well-closed container 1, and is again supplied to each sliding part.

[0016]If the aluminum alloy which is lightweight construction material is used for the turning scroll 6 in this way, for improvement in the speed of a compressor, it will become advantageous. That is, in connection with the reduction of the centrifugal force which acts on a fixed pivot receiving part, it becomes much more effective in improved efficiency, such as a fall of bearing loss.

[0017]Drawing 6 and drawing 7 are the cross-sectional views of the crankshaft 14. In drawing 7, the parallel groove 38 of the channel depth G2 is set as the shank 6c which progressed 90 degrees to the direction of the driving force Ft to the fixed pivot receiving part 31 in shaft orientations. And the parallel groove 32a is established also in the peripheral face 14a of the main bearing part 32 other than the parallel groove 38, and the eccentric shaft part which countered in shaft orientations. The resistance refueled by the both-bearings part with the size of the channel depth G1 and the size of G2 is adjusted, and it is considered as the size relation of G1 <<G2. This is only centrifugal lubrication at the fixed pivot receiving part of an inner periphery, and since it is considering it as the oil supply channel structure performed in the outside main-guide-bearing part 32 by differential pressure oil supply on the other hand, it is for making small oil supply resistance by the side of the fixed pivot receiving part 31 as much as possible. Practical, G1 will become a size of tens of microns, and G2 will become a size of several millimeters.

[0018]Drawing 8 is a fragmentary longitudinal cross-section of the periphery of the bearing parts 31 and 32 showing other examples. Drawing 8 is what has arranged the needle roller bearing (needle type bearing) 33 to the main bearing part by the side of the frame 11, and thereby, the miniaturization ****** of a bearing part can attain the miniaturization of a compressor, and can plan improved efficiency due to the fall of bearing loss. 39 is a sealed bearing part, 39a is a ring groove, and oil supply is made by this portion at 14 g of refraction passages.

[0019]

[Effect of the Invention]According to this invention, there is the following effect.

[0020](1) Since the fixed pivot receiving part 31 and the main bearing part 32 have been arranged, a performance improvement of a bearing part (compressor) can be aimed at by being able to perform the reservation where the amount of oil supply was stabilized, and making shaft length L2 of the fixed pivot receiving part 31 longer than the shaft length L1 of the main bearing part 32.

[0021](2) By sharp reduction of bearing load, especially the performance of the compressor in a high speed area improves.

[0022](3) The suitable forcing means by the side of the fixed scroll 5 can be easily obtained for the back part of the panel peripheral part of a turning scroll. This can take a larger operating pressure ratio to a conventional machine.

[0023](4) A miniaturization and a weight saving can be attained as an encapsulated type scroll compressor, and a production cost can be reduced more to a conventional machine.

[Brief Description of the Drawings]

[Drawing 1]The fragmentary longitudinal cross-section of the periphery of a bearing part showing the composition of this invention.

[Drawing 2]The fragmentary sectional view of the circumference of a seal part.

[Drawing 3]The fragmentary longitudinal cross-section of the periphery of a bearing part showing the composition of this invention.

[Drawing 4]Drawing of longitudinal section of the sealed type scroll compressor of this invention.

[Drawing 5]The fragmentary longitudinal cross-section of the periphery of

a bearing part showing other examples.
[Drawing 6]The cross-sectional view of a crankshaft.
[Drawing 7]The cross-sectional view of a crankshaft.
[Drawing 8]The fragmentary longitudinal cross-section of the periphery of a bearing part showing other examples.
[Drawing 9]The top view of a turning scroll showing the composition of this invention.
[Description of Notations]
1 [-- A fixed scroll, 5a / -- A fixed scroll end plate part, 6 / -- A turning scroll, 22 / -- An oil sump, 31 / -- Turning bearing, 32 / -- Main guide bearing, 41 / -- A backpressure chamber, 45 61 / -- A seal means, 53 54, 55 / -- Converging section.] -- A well-closed container, 1b -- An electric cabin, 3 -- An electric motor, 5
[Drawing 1]

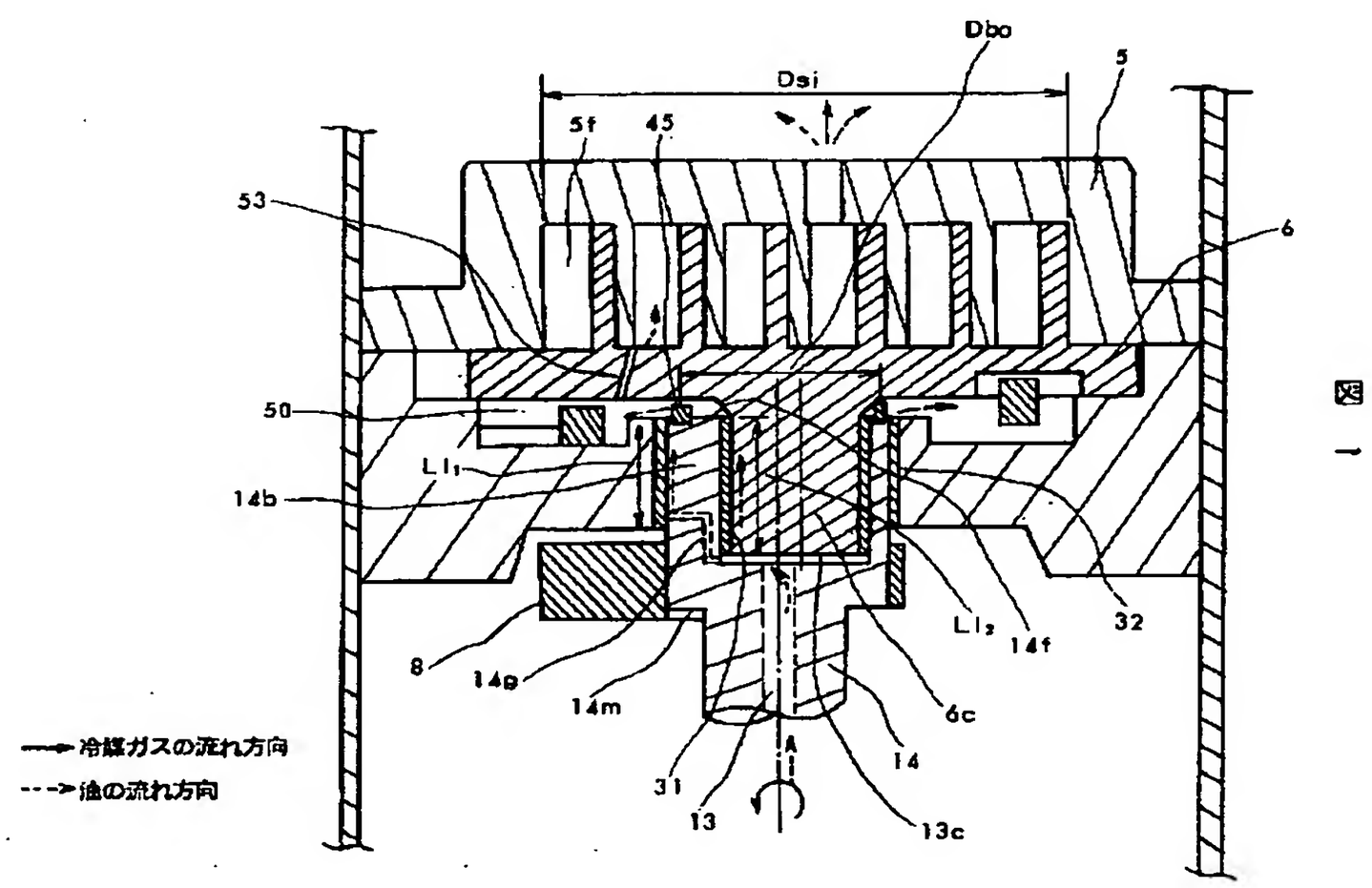
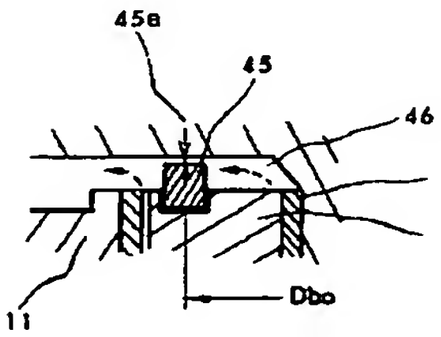


図 1

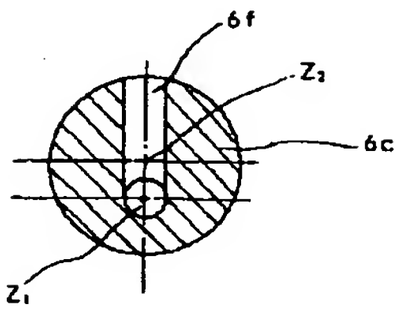
[Drawing 2]

図 2



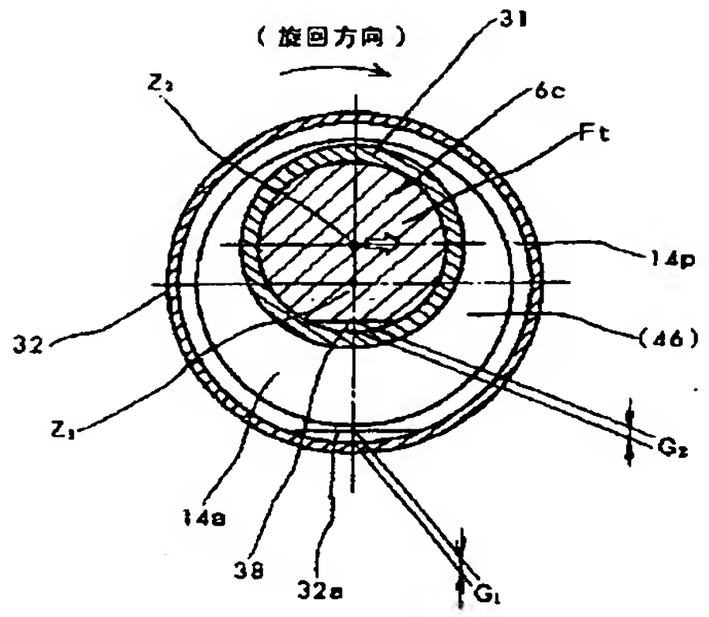
[Drawing 6]

図 6



[Drawing 7]

図 7



[Drawing 3]

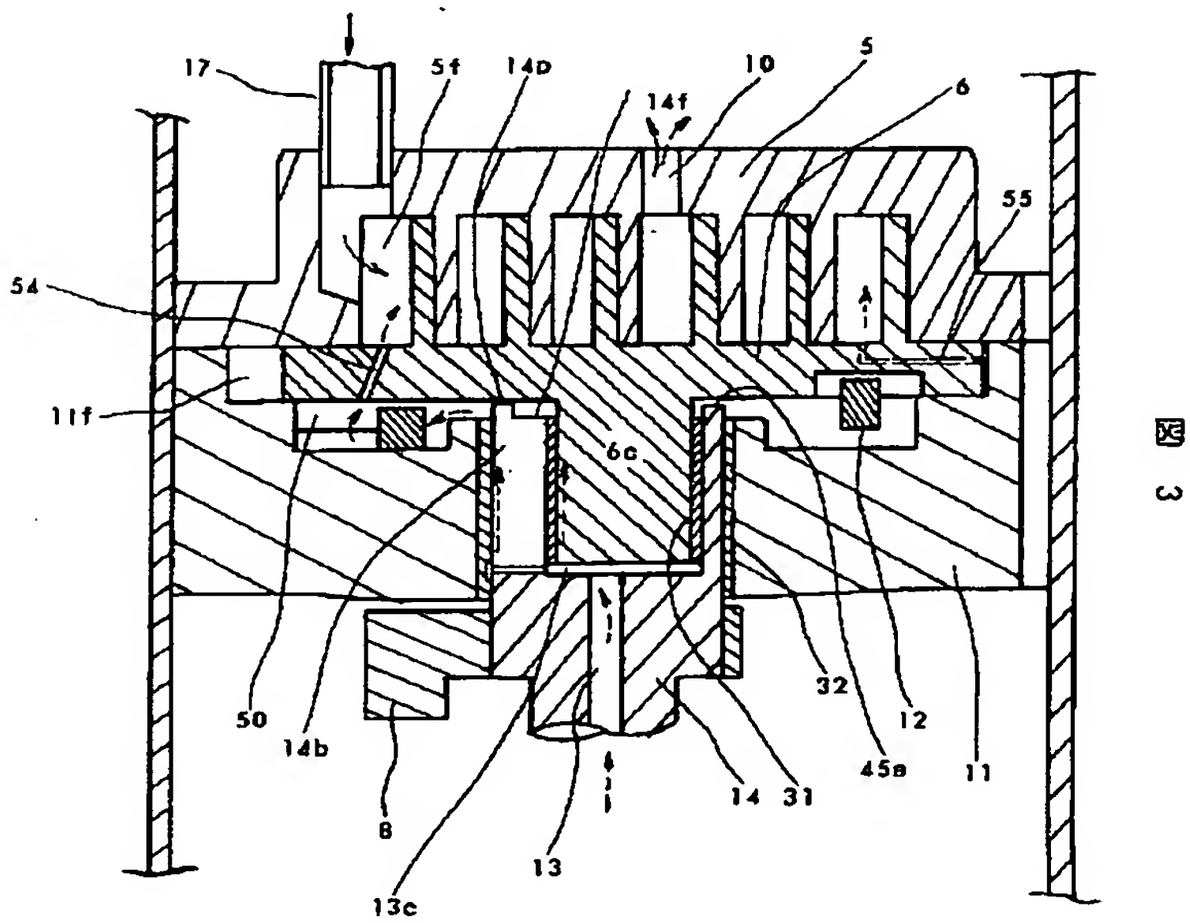
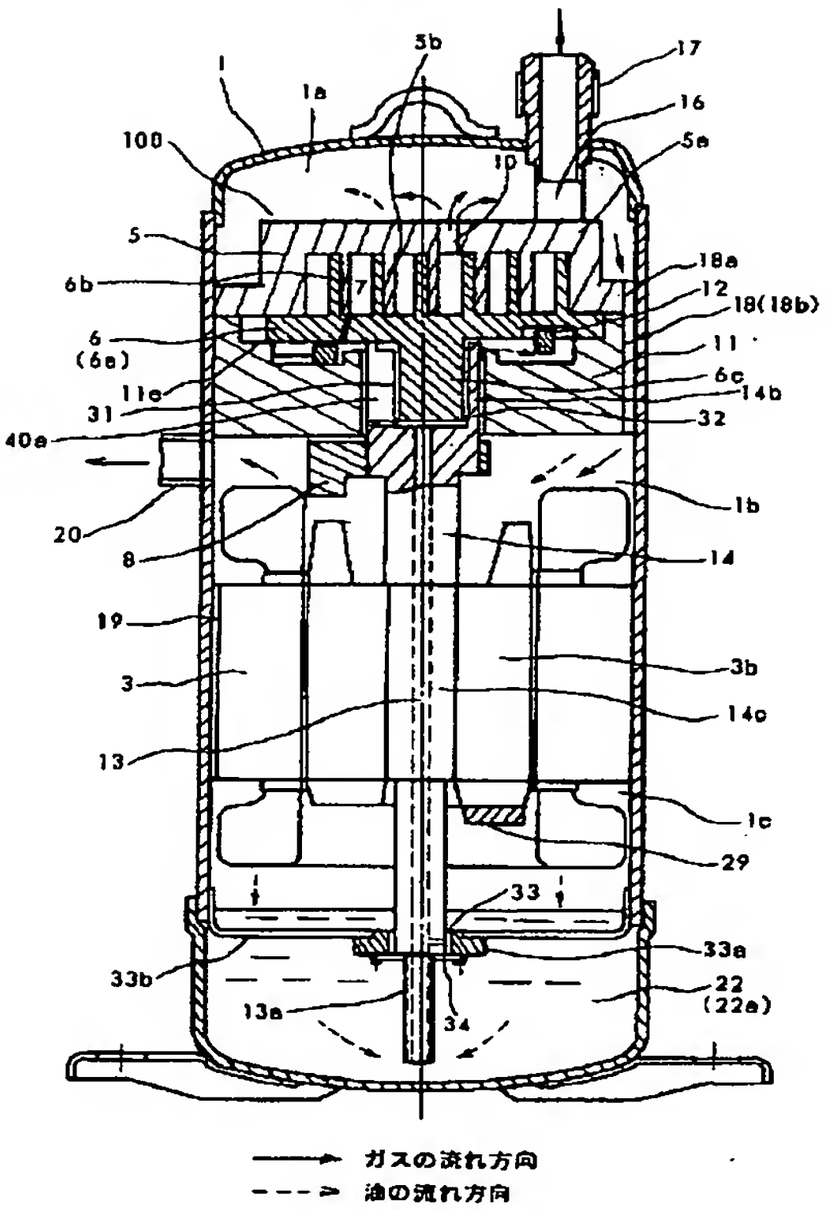


図 3

[Drawing 4]

図 4



[Drawing 5]

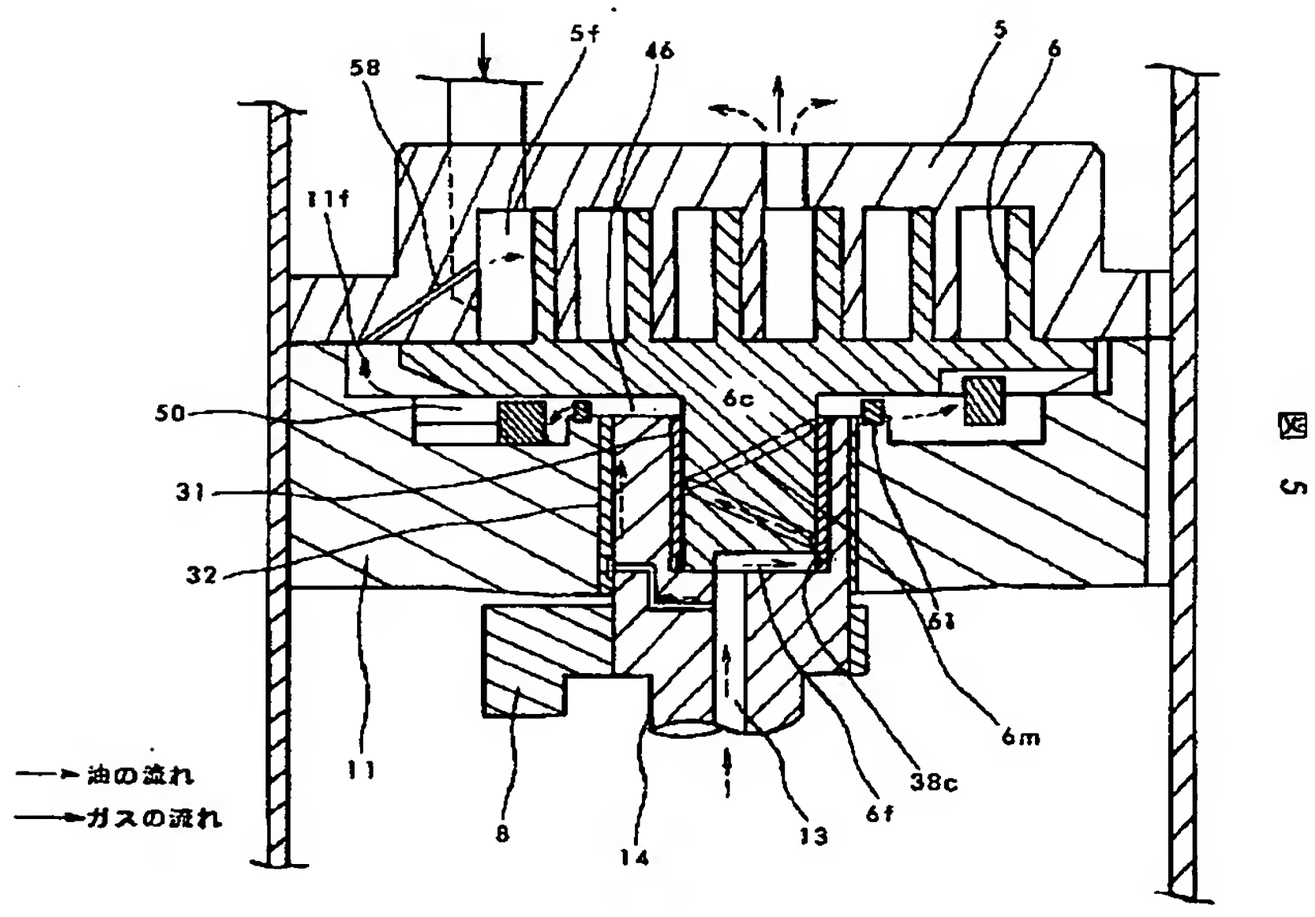


図 5

[Drawing 8]

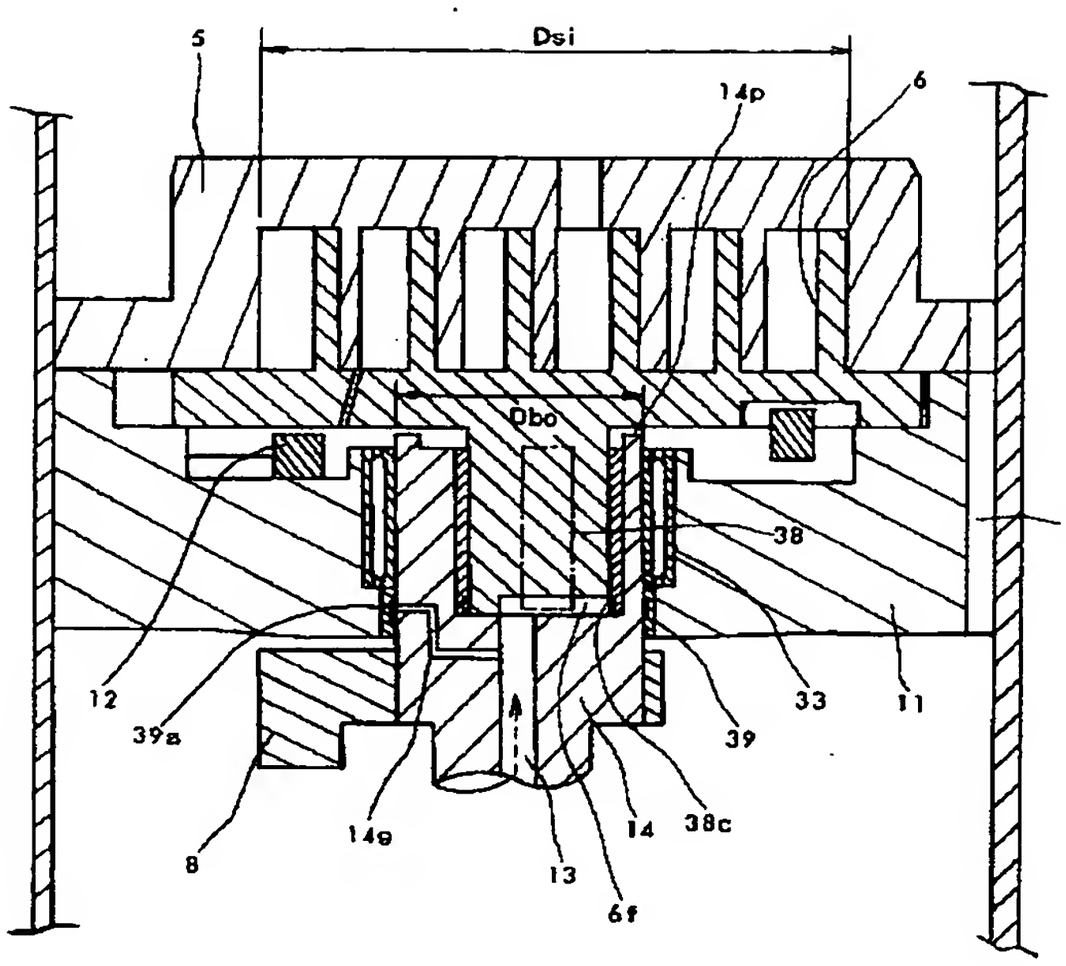
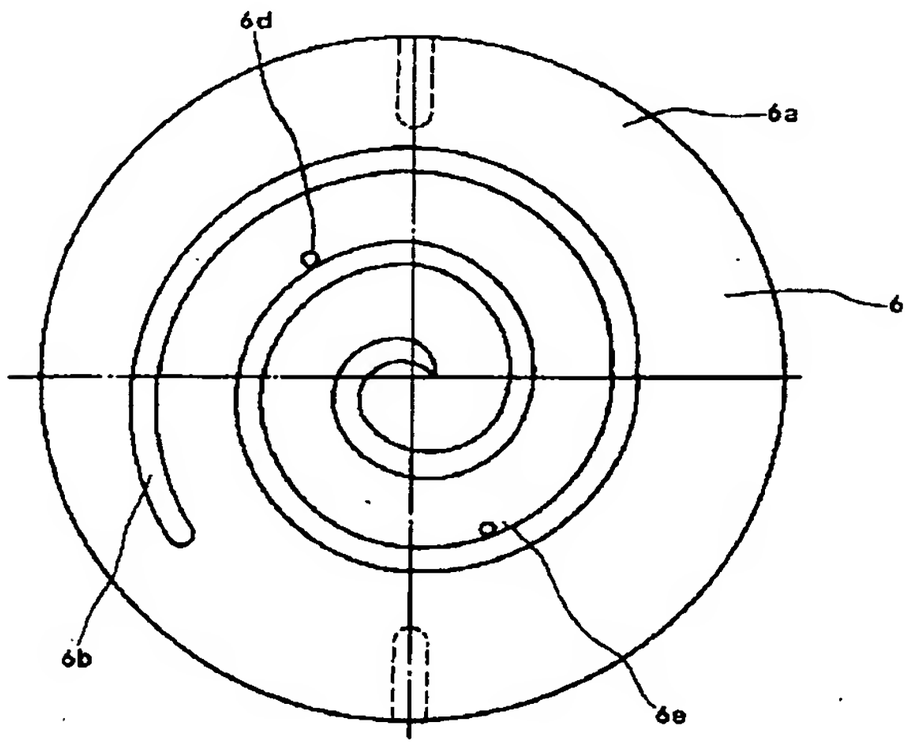


図 8

[Drawing 9]

図 9



Japanese Patent Application Laid-open 08-49671

[Claim(s)]
[Claim 1]A fixed scroll is provided in housing characterized by comprising the following, An eccentric shaft is provided in an end of the axis of rotation supported by front-side of housing rotatable, A scroll compressor in which compression space which supports a movable scroll to the eccentric shaft so that relative rotation is possible, engages a swirl wall of a fixed scroll and a swirl wall of a movable scroll, and carries out capacity reduction with revolution of a movable scroll with the swirl wall and a substrate of both scrollings was formed.
Two or more lock-pins which protruded on a wall of housing.
A mobile pin which protruded on a substrate of a movable scroll so that it might correspond with the lock-pin.
A wear prevention means for a ring which fitted loosely into said lock-pin and a mobile pin constituting a rotation blocking mechanism of a movable scroll, and preventing further wear of a portion into which it ****s with said ring between a wall and a movable scroll.

[Claim 2]The scroll compressor according to claim 1 with which said wear prevention means is provided in a ring.
[Claim 3]The scroll compressor according to claim 2 constituted when said wear prevention means forms the edge of a ring side face in a curved surface.
[Claim 4]The scroll compressor according to claim 3 which said ring consisted of iron system materials, and front housing and a movable scroll which have a wall consisted of an aluminum material or an aluminum alloy, and formed the edge of both side surfaces of a ring in a curved surface.
[Claim 5]The scroll compressor of a ring side face according to any one of claims 2 to 4 which forms a rim end in a curved surface at least.
[Claim 6]The scroll compressor according to claim 1 constituted so that said wear prevention means might be provided in either [at least] an internal surface or a substrate face and the abrasion resistance of the wall or a substrate might be raised.
[Claim 7]The scroll compressor according to claim 6 which is that said wear prevention means performs curing treatment.
[Claim 8]The scroll compressor according to claim 7 which is that said

curing treatment gives cured coating.
[Claim 9]The scroll compressor according to claim 7 which is that said curing treatment forms a board which consists of iron system materials.
[Claim 10]The scroll compressor according to claim 1 which said ring consisted of iron system materials, and front housing and a movable scroll which have a wall consisted of an aluminum material or an aluminum alloy, and performed curing treatment to an internal surface and a substrate face.
[Claim 11]The scroll compressor according to claim 1 with which said wear prevention means is provided in either one of a lock-pin or a mobile pin.
[Claim 12]The scroll compressor according to claim 11 constituted when said wear prevention means establishes a crevice which carries out guide maintenance of the ring in one of tip parts among a lock-pin or a mobile pin.
[Claim 13]The scroll compressor according to claim 11 or 12 with which said ring consists of iron system materials, and front housing and a movable scroll which have a wall consist of an aluminum material or an aluminum alloy.
[Claim 14]Said wear prevention means makes a regulating board intervene between a wall and a substrate of a movable scroll, A crevice formed in a peripheral face of a ring of a common-law marriage end of a restriction hole which is formed in a homonomy system board and permits revolution rotation of a ring is guided, The scroll compressor according to claim 1 furthermore constituted so that an internal surface of a crevice might be contacted by common-law marriage end of the hole and movement by the side of a wall of a ring or a substrate might be regulated.
[Claim 15]The scroll compressor according to claim 14 with which front housing and a movable scroll which have said wall consist of an aluminum material or an aluminum alloy, and said regulating board and a ring consist of iron system materials.
[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the scroll compressor which has a fixed scroll and a movable scroll.
[0002]
[Description of the Prior Art]As a rotation blocking mechanism of the movable scroll in a scroll compressor, there is a thing as shown in drawing

9. That is, the mobile pin 55 of plurality [lock-pins / 52 / two or more] is being fixed to the substrate 54 back of the movable scroll 53 by the 51st page of the wall of the front housing 50, respectively. The ring 56 has fitted loosely into the lock-pin 52 and the mobile pin 55. Therefore, into the ring 56, position regulating of the mobile pin 55 is carried out with the lock-pin 52, and rotation of the movable scroll 53 is prevented. Therefore, the movable scroll 53 only revolves around the sun, while rotation is prevented within the limits of the inside diameter of the ring 56. At this time, the ring 56 also revolves around the sun.

[0003]

[Problem(s) to be Solved by the Invention]However, between the ring 56, the wall 51, and the substrate 54, since smooth revolution, thermal expansion, etc. of the ring 56 are permitted, a certain amount of gap exists. For this reason, for example, when the movable scroll 53 inclines according to the reaction force of liquid compression, etc., after the ring 56 has also inclined according to inclination of the mobile pin 55 fixed to the movable scroll 53, it will revolve around the sun. Therefore, the wall 51 or the substrate 54 ****ed to the edge shape edge 58 of the outside of the ring side face 57, and the wall 51 or the substrate 54 wrote by the edge 58, and it was deleted, and had worn out. When the wall 51 or the substrate 54 was worn out, the gap with the ring 56 spread and inclination of the ring 56 became large, and wear was promoted further and it had been caught in a vicious circle.

[0004]Generally, the iron system material constituted the ring 56, an aluminum material or an aluminum alloy elasticity [iron system material] constituted the front housing 50 and the movable scroll 53, and wear of the above-mentioned wall 51 and the substrate 54 was further promoted from the difference in the construction material.

[0005]When wearing out the wall 51 or the substrate 54 and it was generated by wear waste, the wear waste became a foreign matter in a compressor, it entered into the movable part, smooth **** was prevented, and seizure etc. had occurred. The frictional force which generates wear became revolution resistance of the movable scroll 53, and had led to a fall and energy loss of compression capability. The intensity of the front housing 50 or the movable scroll 53 fell by wear, and it had led to the durability degradation of the compressor as a result. As mentioned above, it originated in wear

of the wall 51 of the front housing 50, or the substrate 54 of the movable scroll 53, and various problems had arisen.

[0006]This invention is made paying attention to the problem which exists in the above-mentioned conventional technology, and the purpose is to provide the scroll compressor which can prevent wear by slide contact to the ring of the wall of front housing, or the substrate of a movable scroll.

[0007]

[Means for Solving the Problem]To achieve the above objects, in an invention of claim 1. Two or more lock-pins which protruded on a wall of housing, and a mobile pin which protruded on a substrate of a movable scroll so that it might correspond with the lock-pin, It is the scroll compressor which constituted a rotation blocking mechanism of a movable scroll with a ring which fitted loosely into said lock-pin and a mobile pin, and established further a wear prevention means for preventing wear of a portion into which it ****s with said ring between a wall and a movable scroll.

[0008]In an invention of claim 2, said wear prevention means is provided in a ring. Said wear prevention means comprises an invention of claim 3 by forming the edge of a ring side face in a curved surface.

[0009]In an invention of claim 4, said ring consists of iron system materials, and front housing and a movable scroll which have a wall consist of an aluminum material or an aluminum alloy, and form the edge of both side surfaces of a ring in a curved surface.

[0010]In an invention of claim 5, it is a thing of a ring side face which forms a rim end in a curved surface at least. Said wear prevention means is provided in either [at least] an internal surface or a substrate face, and it comprises an invention of claim 6 so that the abrasion resistance of the wall or a substrate may be raised.

[0011]In an invention of claim 7, said wear prevention means is performing curing treatment. In an invention of claim 8, said curing treatment is giving cured coating. In an invention of claim 9, said curing treatment is forming a board which consists of iron system materials.

[0012]In an invention of claim 10, said ring consists of iron system materials, and front housing and a movable scroll which have a wall consist of an aluminum material or an aluminum alloy, and perform curing treatment to an internal surface and a substrate face.

[0013]In an invention of claim 11, said wear prevention means is provided

in either one of a lock-pin or a mobile pin. Said wear prevention means comprises an invention of claim 12 by establishing a crevice which carries out guide maintenance of the ring in one of tip parts among a lock-pin or a mobile pin.

[0014]In an invention of claim 13, said ring consists of iron system materials, and front housing and a movable scroll which have a wall consist of an aluminum material or an aluminum alloy.

[0015]In an invention of claim 14, said wear prevention means, A crevice formed in a peripheral face of a ring of a common-law marriage end of a restriction hole which makes a regulating board intervene between a wall and a substrate of a movable scroll, is formed in a homonomy system board, and permits revolution of a ring is guided, Furthermore, movement by the side of a wall of a ring or a substrate is constituted so that an internal surface of a crevice may be contacted and regulated by common-law marriage end of the hole.

[0016]In an invention of claim 15, front housing and a movable scroll which have said wall consist of an aluminum material or an aluminum alloy, and said regulating board and a ring consist of iron system materials.

[0017]

[Function]In the invention of claim 1 of the above-mentioned composition, a mobile pin is regulated via a ring with a lock-pin, and rotation of a movable scroll is prevented. Therefore, while the mobile pin fixed to the movable scroll is also regulated with the ring with a ring in the circumference of the lock-pin fixed to the wall with revolution of a movable scroll, it revolves around the sun. That is, a movable scroll only revolves around the sun, while rotation is prevented. And wear by slide contact to a wall or the ring of a substrate can be reduced by a wear prevention means.

[0018]In the invention of claim 2, wear of the wall or substrate to which the ring ****s can be reduced by the wear prevention means provided in the ring. The edge of the ring side face is formed in the curved surface in the invention of claim 3. Therefore, it is not written and deleted even if a wall or a substrate ****s to the edge of the ring. Therefore, wear of a wall and a substrate can be reduced.

[0019]The edge of the both side surfaces of a ring was formed in the curved surface in the invention of claim 4. For this reason, even if the ring which consists of iron system materials ****s to the wall and movable scroll which

consist of an aluminum material or an aluminum alloy elasticity [iron system material / the], it writes and it is not shaved. Therefore, it can reduce wearing out the wall and a movable scroll. And since its endurance improves since a ring consists of iron system materials, and a wall and a movable scroll consist of an aluminum material or an aluminum alloy, the weight saving of a compressor is attained.

[0020]In the invention of claim 5, by [of a ring side face] forming a rim end in a curved surface at least, even if a wall or a substrate ****s to a ring by an inclining state, it is not written and deleted, and wear of a wall or a substrate can be reduced.

[0021]In the invention of claim 6, the abrasion resistance of a wall or a substrate improves and wear by the slide contact of a ring can be reduced. In the invention of claim 7, the abrasion resistance of an internal surface or a substrate face improves by curing treatment, and wear by the slide contact of a ring can be reduced.

[0022]In the invention of claim 8, by giving cured coating to an internal surface or a substrate face, abrasion resistance improves and wear by the slide contact of a ring can be reduced. By forming the board which consists of iron system materials in an internal surface or a substrate face in the invention of claim 9, For example, when an aluminum material or an aluminum alloy constitutes front housing or a movable scroll, the weight saving of the compressor by aluminum or an aluminum alloy and the strong point of both materials called improvement in the abrasion resistance by forming the board which consists of iron system materials can be employed efficiently.

[0023]In the invention of claim 10, since its endurance improves since a ring consists of iron system materials, and front housing and a movable scroll consist of an aluminum material or an aluminum alloy, the weight saving of a compressor is attained. Wear by slide contact to the ring of the internal surface and a substrate face can be reduced by having done this effect so and moreover having performed curing treatment to the internal surface and the substrate face.

[0024]In the invention of claim 11, wear of a wall or a substrate can be prevented by the wear prevention means provided in one pin. In the invention of claim 12, since guide maintenance of the ring is carried out by the crevice established in the lock-pin or the mobile pin, a wall or a substrate

does not **** to a ring. For this reason, wear of the internal surface and a substrate can be prevented.

[0025]In the invention of claim 13, since its endurance improves since a ring consists of iron system materials, and front housing and a movable scroll consist of an aluminum material or an aluminum alloy, the weight saving of a compressor is attained. This effect is done so and, moreover, a wall or a substrate does not **** to a ring. Therefore, wear of the internal surface and a substrate can be prevented.

[0026]In the invention of claim 14, the crevice of a ring is guided by the common-law marriage end of a regulating board, further, the internal surface of a crevice is contacted by the common-law marriage end of the hole, and movement by the side of the wall of a ring or a substrate is regulated. For this reason, a wall or a substrate does not **** to a ring. Therefore, wear of the internal surface and a substrate can be prevented.

[0027]In the invention of claim 15, since a regulating board and a ring consist of iron system materials, their endurance improves. Since front housing and a movable scroll consist of an aluminum material or an aluminum alloy, the weight saving of a compressor is attained. This effect is done so and, moreover, wear of an internal surface and a substrate can be prevented.

[0028]

[Example]Hereafter, the 1st example that materialized this invention is described according to a drawing. As shown in drawing 1, junction immobilization of the front housing 2 and the rear housing 3 which consist of aluminum materials (an aluminum material contains an aluminum alloy in this example) is carried out in the both-ends side before and after the fixed scroll 1 which serves as center housing. In the front housing 2, the axis of rotation 4 is supported by the bearing 5 pivotable. The eccentric shaft 6 is being fixed to the eccentric position of the inner end surface of the axis of rotation 4. The balance weight 7 and the bush 8 are supported by the eccentric shaft 6 rotatable, and omission are prevented by the locking member 9 which engaged with the tip part of the eccentric shaft 6.

[0029]Via the bearing 13, the cylindrical boss section 12 really formed in the rear central part of the substrate 11 of the movable scroll 10 which consists of aluminum materials has fitted into the peripheral face of said

bush 8 so that relative rotation is possible. And the compression space 100 is formed with the substrates 14 and 11 and the swirl walls 15 and 16 of the fixed scroll 1 and the movable scroll 10 which counter.

[0030]The discharge port 17 is drilled in substrate 14 center section of the fixed scroll 1, and the regurgitation room 18 and the compression space 100 which were formed in the rear housing 3 via the discharge port 17 are opened for free passage. By the regurgitation room 18 side, the discharge port 17 is blockaded by the discharge valve 19 so that opening is possible.

[0031]As shown in drawing 2, between the wall 20 of the front housing 2 which counters the movable scroll 10, and the substrate 11 back of the movable scroll 10, Rotation of the movable scroll 10 is prevented, and revolution is permitted and the rotation blocking mechanism 21 for spreading the compressive reaction to the thrust direction 200 at the time of a compressor operation to said wall 20 intervenes.

[0032]As shown in drawing 1 - drawing 3, the rotation blocking mechanism 21, The lock-pin 22 which consists of an iron system material implanted in the 20th page of the wall of the front housing 2 with the constant interval, It consists of the mobile pin 23 which consists of an iron system material implanted in the substrate 11 back of the movable scroll 10 with the constant interval, and the ring 24 which consists of an iron system material which fitted loosely into this lock-pin 22 and mobile pin 23. In this example, both the lock-pin 22 and the four mobile pins 23 are formed at intervals of 90 degrees. And the wear prevention means is made by constituting the rim ends 27 and 28 and the common-law marriage ends 29 and 30 of the both side surfaces 25 and 26 of the ring 24 on a curved surface. The curved surface of these inside-and-outside edges 27-30 serves as semicircular state in detail to cross section circular and a pan.

[0033]Rotation of the movable scroll 10 is prevented by operation of said lock-pin 22, the mobile pin 23, and the ring 24, and revolution is permitted. Therefore, while the mobile pin 23 fixed to the movable scroll 10 is also regulated by the ring 24 with the ring 24 in the circumference of the lock-pin 22 fixed to the wall 20 with revolution of the movable scroll 10, it revolves around the sun.

[0034]As for the compressor of the above-mentioned composition, the refrigerant gas introduced from the suction port where the movable scroll 10 revolves the surroundings of the axis of rotation 4 around the sun, and

does not illustrate them flows into the compression space 100 during both the scrollings 1 and 10 with revolution of the eccentric shaft 6. Carrying out capacity reduction with revolution of the movable scroll 10, towards between the leaders of the swirl walls 15 and 16 of both the scrollings 1 and 10, it converges and the compression space 100 goes. The refrigerant gas compressed by capacity reduction of the compression space 100 is breathed out into the regurgitation room 18 from the discharge port 17.

[0035]If the movable scroll 10 inclines according to the reaction force of the liquid compression in the compression space 100, etc., for example at the time of the operation of a compressor and it revolves around the sun, by devotion of the mobile pin 23 fixed to the movable scroll 10. The ring 24 revolves around the sun by an inclining state, and the substrate 11 of the wall 20 or the movable scroll 10 ****s at the rim ends 27 and 28 of the ring 24 by a big pressure. However, since the rim ends 27 and 28 of the ring 24 are formed in the curved surface, the wall 20 or the substrate 11 writes and is not shaved. Therefore, wear of the wall 20 or the substrate 11 can be reduced remarkably.

[0036]The compressive reaction to the thrust direction 200 acts on the movable scroll 10, the substrate 11 pushes the ring 24 against the wall 20, and the movable scroll 10 and the ring 24 revolve around the sun in the state. The wall 20 and the substrate 11 which consist of aluminum materials **** on the sides 25 and 26 of the ring 24 which becomes from an iron system material also at this time. However, since the inside-and-outside edges 27-30 of the ring 24 are formed in the curved surface, the wall 20 or the wear degree of the substrate 11 can be stopped substantially.

[0037]As mentioned above, according to this example, wear by slide contact to the wall 20 or the ring 24 of the substrate 11 can be reduced. For this reason, the foreign matter generation by wear is suppressed and the seizure of a movable part based on a foreign matter, etc. can be prevented. Frictional resistance can be reduced, smooth revolution of the movable scroll 10 can be permitted, and the fall of the compression capability of a compressor can be suppressed. Since the front housing 2 and the movable scroll 10 write and are not deleted, those strength deterioration can be reduced and the endurance of a compressor improves.

[0038]Therefore, although it is lightweight like this example compared with

an iron system material, even if an elasticity aluminum material constitutes the front housing 2 and the movable scroll 10, the wear is not a degree about which it is apprehensive, and can contribute to the weight saving of a compressor, improvement in compression capability, etc.

[0039]Since the iron system material constituted the ring 24, endurance improves, and they are iron system materials in the lock-pin 22 and the mobile pin 23. For this reason, there is also little wear with the ring 24 and the pins 22 and 23 there is no fear of welding and according to contact.

[0040]In the drawing, the gap of the wall 20 and the ring 24 and the gap of the substrate 11 and the ring 24 are exaggerated and written, in order to understand easily.

[0041]

[Other Example(s)]Hereafter, another example which materialized this invention is described according to a drawing. Only a point of difference with the 1st example of the above is explained.

[0042]The 2nd example is shown in drawing 4. In the 3rd example stated to this example and the following, it differs from the 1st example of the above in that edge is attached to the edge 37 of the ring 35 side. And in this example, nickel phosphorus plating 36 is performed to the wall 20 and the substrate 11 back of the movable crawl 10 as curing treatment, and the wear prevention means is made. Therefore, the abrasion resistance of the wall 20 which consists of aluminum materials, and the substrate 11 surface improves by this nickel phosphorus plating 36. For this reason, wear by the slide contact of the ring 35 in the wall 20 and the substrate 11 can be reduced.

[0043]The 3rd example is shown in drawing 5 and drawing 6. In this example, the wear prevention means is made by attaching the flanges 39 and 40 of a couple around the lock-pin 38. The edge 42 of the flange 40 by the side of the movable scroll 10 is making the shape of a circle. And the ring 35 fits loosely into the crevice 41 constituted by the flanges 39 and 40, and it revolves around the sun, being guided to the crevice 41. In this example, guide maintenance of the ring 35 is carried out by the flanges 39 and 40 of the couple provided in the lock-pin 38. For this reason, even if the ring 35 tends to be moved or tilted to the wall 20 or substrate 11 side, in order that the internal surface of the flanges 39 and 40 may be contacted

by the side of the ring 35 and may regulate movement or devotion of the ring 35, the ring 35 does not **** to the wall 20 or the substrate 11. As mentioned above, the wall 20 and the substrate 11 do not **** to the ring 35, and the wall 20 and the substrate 11 do not have a possibility of wearing out.

[0044]Since the edge 42 by the side of the movable scroll 10 of the flange 40 is making the shape of a circle, even if it ****s to the substrate 11, the substrate 11 is not worn out by the edge 42.

[0045]The 4th example is shown in drawing 7 and drawing 8. The regulating board 44 which consists of an iron system material of doughnut form is made to intervene between the connecting end faces of the front housing 2 and the center housing 1 in this example. The bore 45 is installed through the center section of this regulating board 44, and the bore 45 has fitting with the bush 8 and the boss section 12 of the movable scroll 10 and the movable scroll 10, and a path that permits revolution of the bush 8. And the restriction hole 46 which regulates revolution of the ring 47 is drilled in the hoop direction of the homonomy system board 44 at equal intervals (in this example, they are four places). On the other hand, the crevice 48 is attached around the peripheral face of the circular ring 47. And the ring 47 revolves around the sun, while the crevice 48 is guided to the opening edge of the restriction hole 46.

[0046]Even if the ring 47 tends to be moved or tilted to the wall 20 or substrate 11 side at this time, the opening edge of the restriction hole 46 is contacted and controlled by the wall of the crevice 48. In this example, since guide maintenance of the ring 47 is carried out by the regulating board 46 as a wear prevention means, and the crevice 48 of the ring 47, the wall 20 and the substrate 11 do not **** to the ring 47. Therefore, the wall 20 and the substrate 11 are not worn out.

[0047]This invention is not limited to the above-mentioned example, and can be carried out in the following modes in the range which does not deviate from the meaning of this invention.

(1) In each above-mentioned example, the four rotation blocking mechanisms 21 provided 1 set which consists the lock-pin 22, the 38 mobile pin 23, and it of the wrap rings 24, 35, and 47 between the wall 20 and the substrate 11, and were constituted. However, three places (120-degree interval) - a 12-place (30-degree interval) grade may form not the thing limited to

this but the lock-pin 22, the 38 mobile pin 23, and the rings 24, 35, and 47 in a hoop direction, and the rotation blocking mechanism 21 may be constituted.

(2) Form only the rim ends 27 and 28 of the ring 24 in a curved surface in the 1st example of the above.

(3) In the 1st example of the above, constitute either one of the front housing 2 or the movable scroll 10 with an aluminum material or an aluminum alloy, and while counters it and constitute only the edges 27-30 of the ring side faces 25 and 26 on a curved surface. in this case, the rim ends 27 and 28 -- it is good.

(4) In the 2nd example of the above, although curing treatment was the nickel phosphorus plating 36 as a cured film, it is not limited to this, and form and constitute the board which becomes either [at least] the wall 20 or the movable scroll 10 from an iron system material.

(5) In the 2nd example of the above, an aluminum material or an aluminum alloy constitutes either one of the front housing 2 or the movable scroll 10, Give the cured film 36 only to the 20th page of the near wall or the substrate 10 surface constituted with the aluminum material or the aluminum alloy.

(6) In the 2nd example of the above, the cured film as curing treatment is not limited to this which was materialized by the nickel phosphorus plating 36, and may be materialized, for example to oxidize nickel boron plating, and the 20th page of a wall and the substrate 11 surface.

(7) In the 3rd example of the above, although the flanges 39 and 40 were formed at the tip of the lock-pin 38, change this and form the flanges 39 and 40 of a couple at the tip of the mobile pin 23. In this case, in order that the movable scroll 10 may follow on concentrating and the mobile pin 23 may also incline, the ring 35 is moved to wall 20 side or substrate side 10, but. Since the flanges 39 and 40 of the mobile pin 23 are projected from other parts, the ring 35 does not **** to the wall 20 or the substrate 10 only by the said divisions 39 and 40 which consist of iron system materials ****ing.

(8) Even if there are few rings, it is good also as a wear prevention means to carry out chamfering work of the rim end. If it does in this way, wear can be reduced by easy processing of a ring.

[0048]Technical thought other than the claim which can be grasped from the

above-mentioned example is indicated with the effect below.
(1) The scroll compressor according to claim 1 constituted when said wear prevention means cuts off the edge of a ring the corners.
[0049]If it does in this way, wear can be reduced by easy processing of a ring.
(2) The scroll compressor according to any one of claims 1 to 15 which the lock-pin 22 and the mobile pin 23 comprised with the iron system material.
[0050]If it does in this way, there is no fear of welding by slide contact to the ring 24 which are iron system materials, and a wear degree can be stopped.
[0051]
[Effect of the Invention]As explained in full detail above, according to the invention of claim 1, wear by slide contact to a wall or the ring of a substrate can be reduced by a wear prevention means.
[0052]According to the invention of claim 2, wear of the wall or substrate to which the ring ****s can be reduced by the wear prevention means provided in the ring. According to the invention of claim 3, the edge of the ring side face is formed in the curved surface. For this reason, even if the edge ****s, write a wall or a substrate and it is not shaved, and that wear can be reduced.
[0053]According to the invention of claim 4, it can reduce wearing out the ring which consists of iron system materials in slide contact with the wall and movable scroll which consist of an aluminum material or an aluminum alloy elasticity [iron system material / the]. And since a wall and a movable scroll consist of an aluminum material or an aluminum alloy, the weight saving of a compressor is attained.
[0054]According to the invention of claim 5, even if a wall or a substrate ****s to a ring by an inclining state by [of a ring side face] forming a rim end in a curved surface at least, the wall or a substrate writes, and is not shaved and the wear can be reduced.
[0055]According to the invention of claim 6, the abrasion resistance of a wall or a substrate improves and wear by the slide contact of a ring can be reduced. According to the invention of claim 7, even if the curing treatment of an internal surface or a substrate face ****s to the internal surface or a substrate face with a ring, the wear can be reduced by it.
[0056]According to the invention of claim 8, the wear can be reduced, even

if the abrasion resistance of an internal surface or a substrate face improves and it ****s with a ring with a cured film. According to the invention of claim 9, with the board which consists of an iron system material provided in the internal surface or the substrate face. For example, when an aluminum material or an aluminum alloy constitutes front housing or a movable scroll, the weight saving of the compressor by aluminum or an aluminum alloy and the strong point of both materials called improvement in the abrasion resistance by forming the board which consists of iron system materials can be employed efficiently.

[0057]According to the invention of claim 10, the endurance of a ring improves and, moreover, the weight saving of a compressor is attained. This effect is done so and, moreover, wear by slide contact to the ring of the internal surface and a substrate face can be reduced by the curing treatment of an internal surface and a substrate face.

[0058]According to the invention of claim 11, wear of a wall or a substrate can be prevented by the wear prevention means provided in one pin. According to the invention of claim 12, since guide maintenance of the ring is carried out by the crevice, a wall or a substrate does not **** to a ring. For this reason, wear of the internal surface and a substrate can be prevented.

[0059]According to the invention of claim 13, the endurance of a ring improves and, moreover, the weight saving of a compressor is attained. This effect is done so and, moreover, a wall or a substrate does not **** to a ring. Therefore, wear of the internal surface and a substrate can be prevented.

[0060]According to the invention of claim 14, since a ring is guided by a regulating board and movement of a ring is further regulated by the hole, a wall or a substrate does not **** to a ring. Therefore, wear of the internal surface and a substrate can be prevented.

[0061]According to the invention of claim 15, the endurance of a regulating board and a ring improves and, moreover, the weight saving of a compressor is attained. This effect is done so and, moreover, wear of an internal surface and a substrate can be prevented.

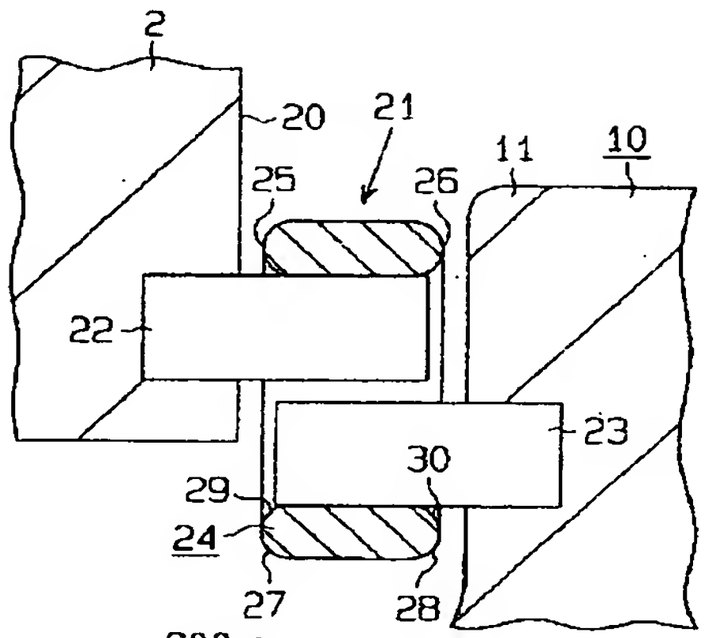
[Brief Description of the Drawings]

[Drawing 1]It is a figure showing the 1st example that materialized this invention, and is drawing of longitudinal section of a scroll compressor.

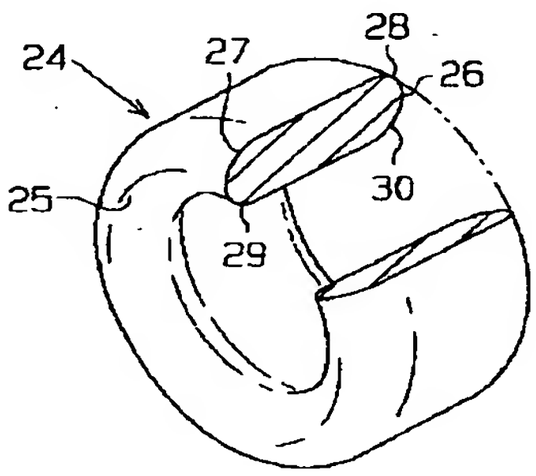
[Drawing 2]It is a figure expanding and showing the rotation blocking

mechanism in drawing 1.
[Drawing 3]It is a perspective view showing a ring.
[Drawing 4]It is a figure showing the 2nd example, and is a section enlarged drawing of a rotation blocking mechanism.
[Drawing 5]It is a figure showing the 3rd example, and is a section enlarged drawing of a rotation blocking mechanism.
[Drawing 6]It is a perspective view of a rotation blocking mechanism.
[Drawing 7]It is a figure showing the 4th example, and is an expansion perspective view of a rotation blocking mechanism.
[Drawing 8]It is a section enlarged drawing of a rotation blocking mechanism.
[Drawing 9]It is a section enlarged drawing showing the rotation blocking mechanism in the conventional scroll compressor.
[Description of Notations]
1 -- The fixed scroll, 2 which serve as center housing -- Front housing which is a front-side of housing, 4 [-- The substrate of a movable scroll,] -- The axis of rotation, 6 -- An eccentric shaft, 10 -- A movable scroll, 11 14 [-- Wall,] -- The substrate of a fixed scroll, 15 -- A swirl wall, 16 -- A swirl wall, 20 21 [-- Ring,] -- A rotation blocking mechanism, 22 -- A lock-pin, 23 -- A mobile pin, 24 25 -- A ring side face, 26 -- A ring side face, 27 -- The rim end of a ring side face, 28 -- The rim end of a ring side face, 29 -- The common-law marriage end of a ring side face, 30 -- The common-law marriage end of a ring side face, 35 [-- The flange, 40 which form a crevice / -- The flange, 41 which form a crevice / -- A crevice, 44 / -- A regulating board, 46 / -- A restriction hole, 47 / -- A ring, 48 / -- A crevice, 100 / -- Compression space.] -- A ring, 36 -- Nickel phosphorus plating as cured coating, 38 -- A lock-pin, 39

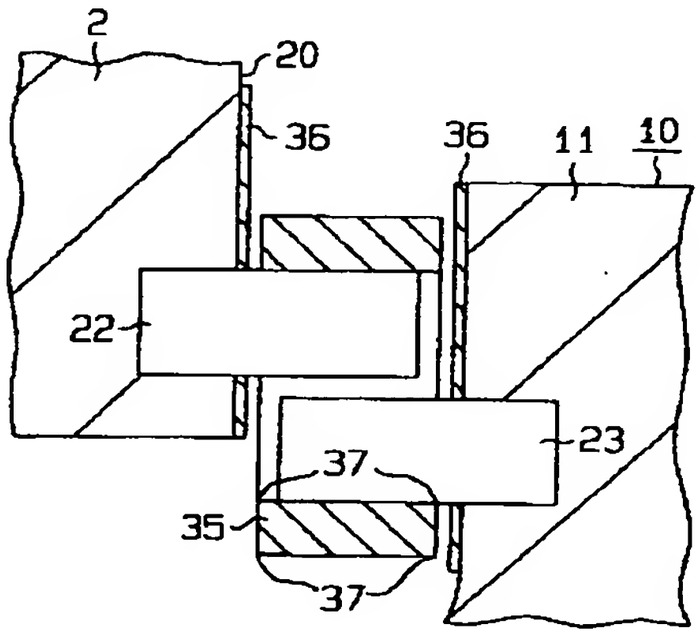
[Drawing 2]



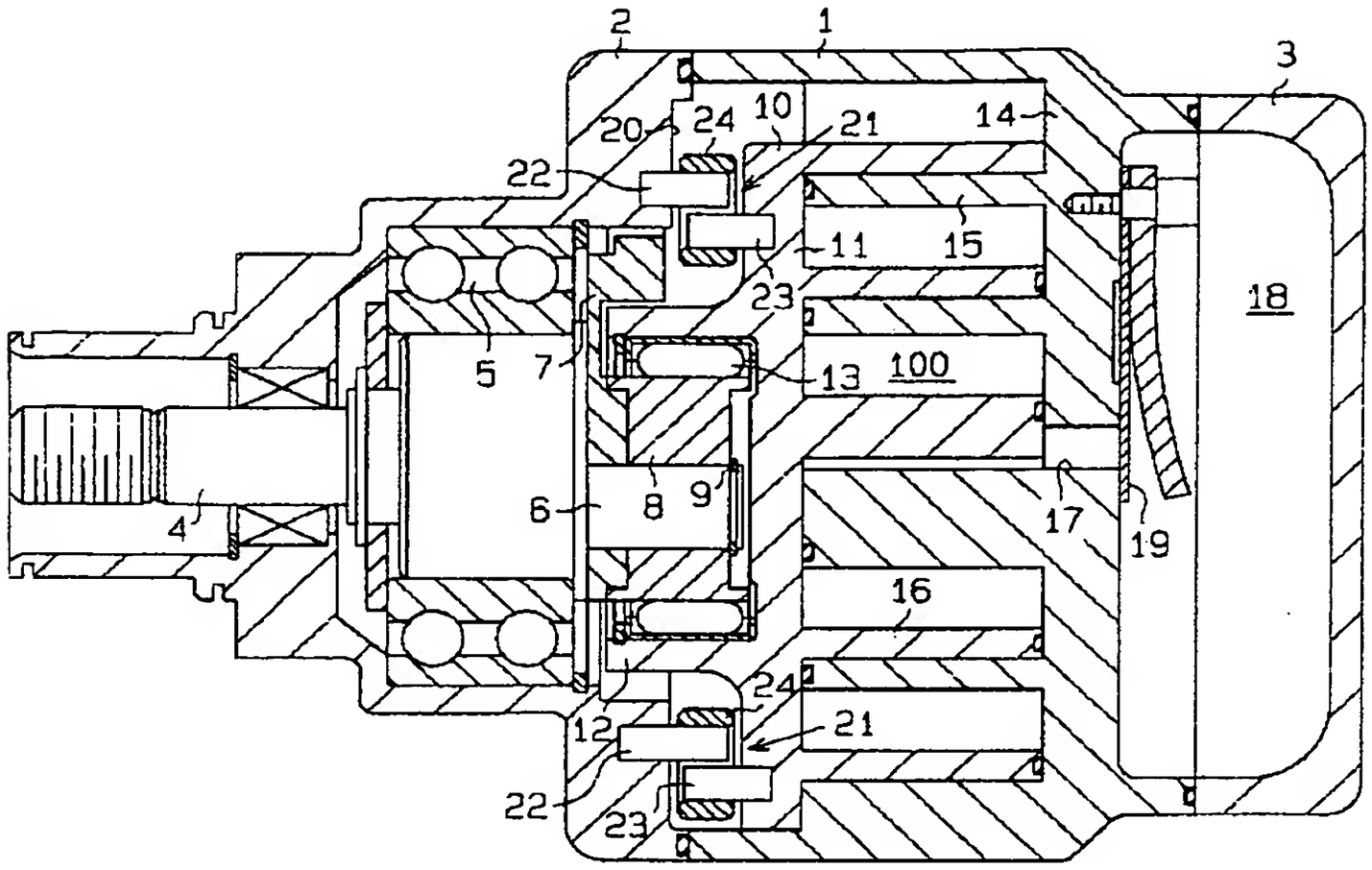
[Drawing 3]



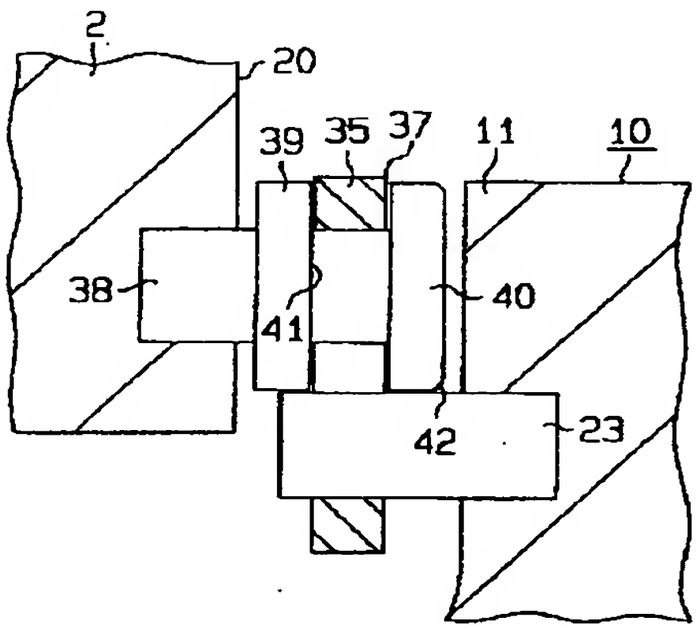
[Drawing 4]



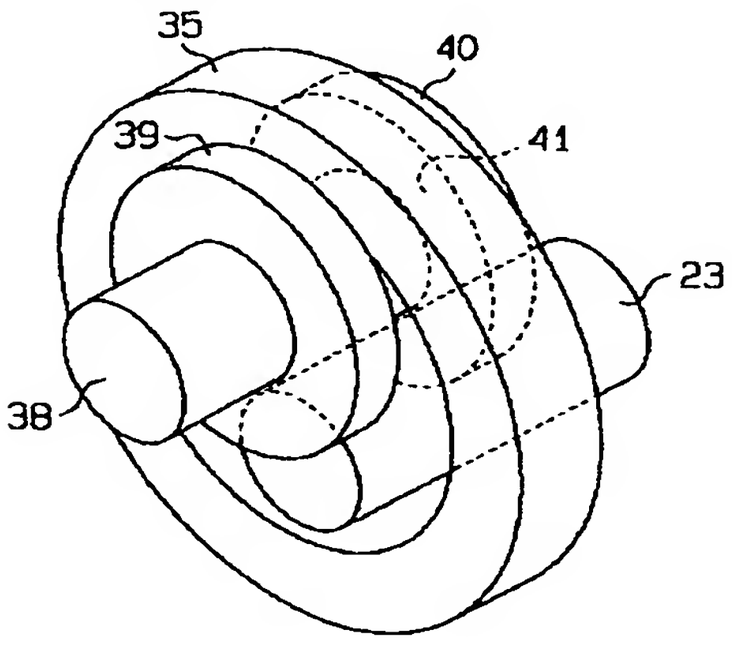
[Drawing 1]



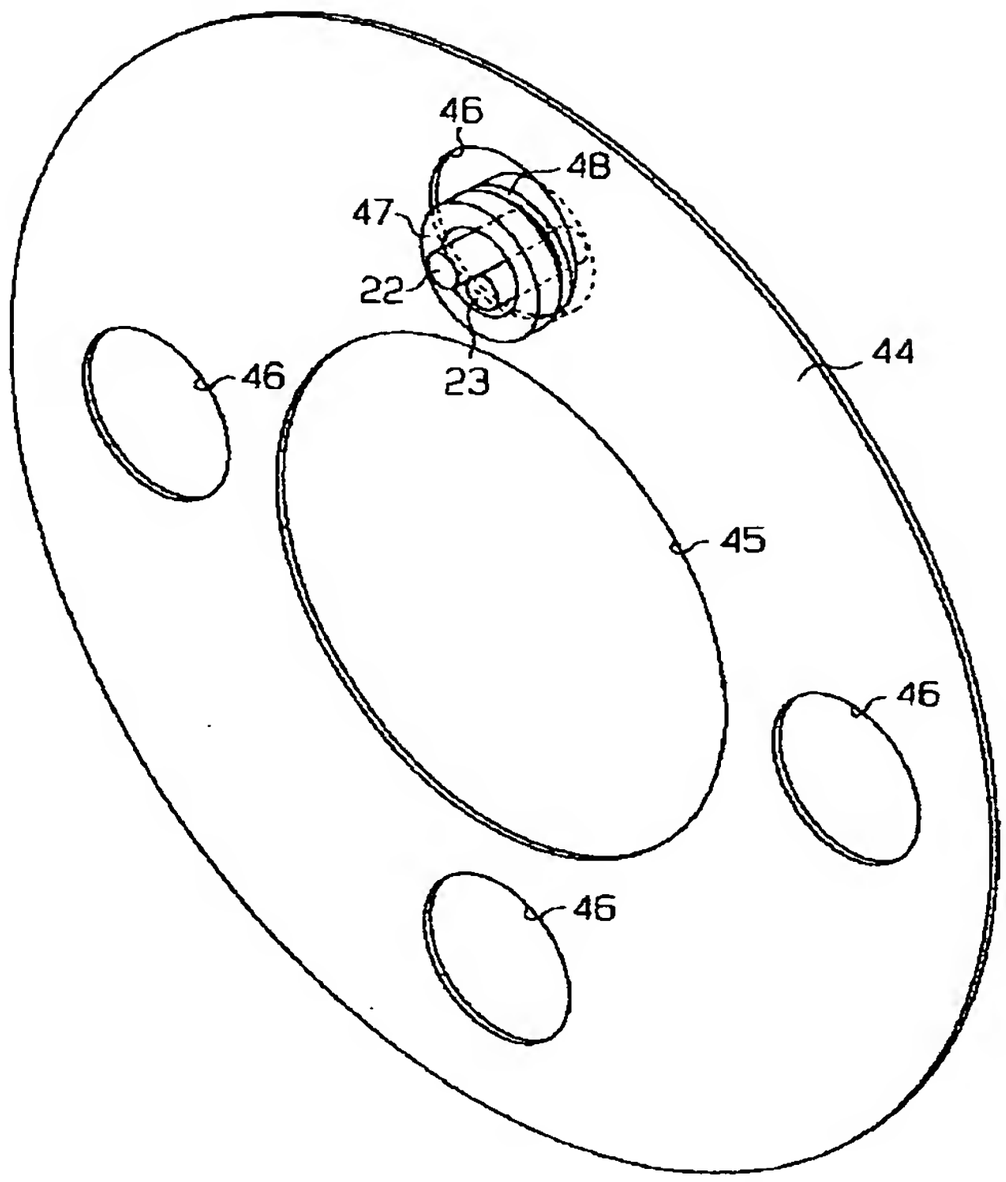
[Drawing 5]



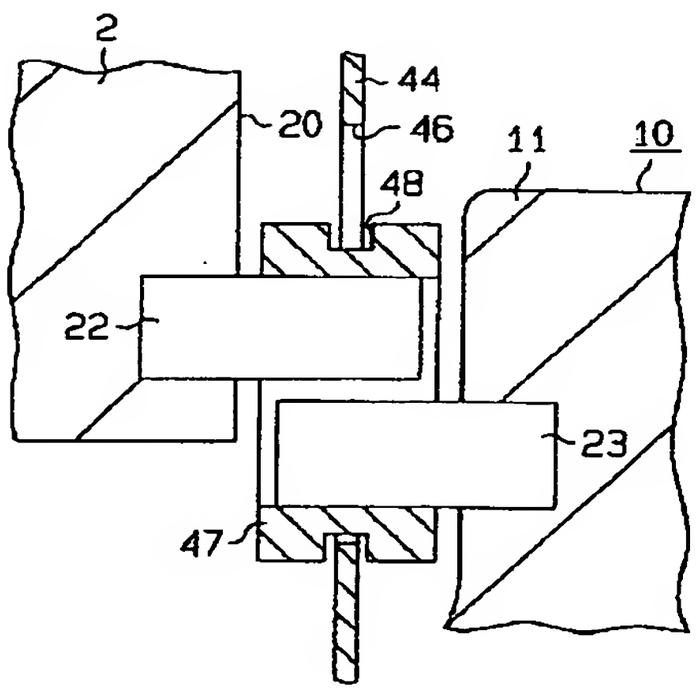
[Drawing 6]



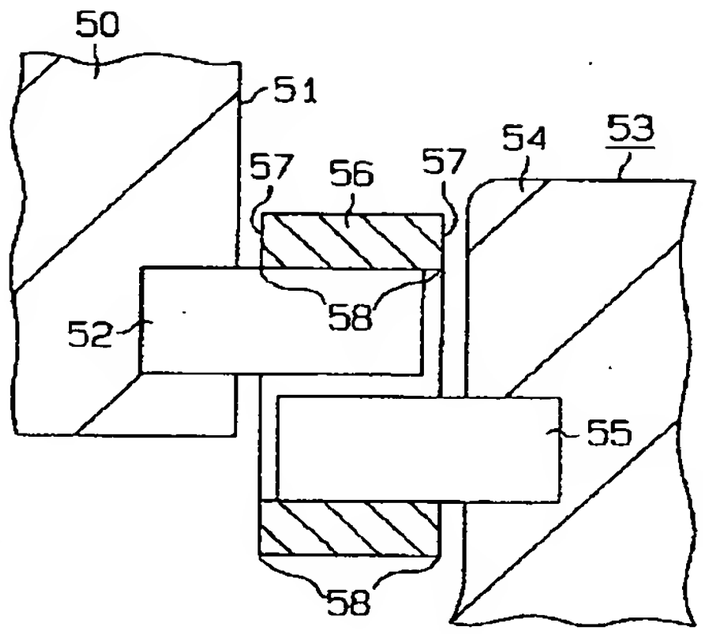
[Drawing 7]



[Drawing 8]



[Drawing 9]



CORRECTION OR AMENDMENT

[Kind of official gazette]Printing of amendment by the regulation of 2 of Article 17 of Patent Law

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[Amendment 1]

[Document to be Amended]Specification

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[Method of Amendment]Change
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[0031]As shown in drawing 2, between the wall 20 of the front housing 2 which counters the movable scroll 10, and the substrate 11 back of the movable scroll 10, rotation of the movable scroll 10 is prevented and the rotation blocking mechanism 21 for permitting revolution intervenes.
[Amendment 2]
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⑤4発明の名称　スクロール式流体機械

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明　細　書

1．発明の名称

スクロール式流体機械

2．特許請求の範囲

（1）ケーシングと、該ケーシングに設けられた固定スクロールと、前記ケーシングに回転自在に設けられた駆動軸と、該駆動軸のクランク軸に旋回軸受を介して回転自在に設けられ、前記固定スクロールに対して偏心して回転する旋回スクロールと、該旋回スクロールの鏡板と前記ケーシングとの間に設けられたスラストすべり軸受とからなるスクロール式流体機械において、前記旋回スクロール及びスラストすべり軸受のいずれか一方をアルミニウム材により形成すると共に、他方を高機能性エンジニアリングプラスチックにより形成し、かつ、アルミニウム材により形成した該旋回スクロール又はスラストすべり軸受の摺接面には硬化処理により酸化被膜を形成したことを特徴とするスクロール式流体機械。

（2）前記高機能性エンジニアリングプラスチックは、ＰＥＥＫ（ポリエーテルエーテルケトン）又はＰＥＳ（ポリエーテルサルフォン）である特許請求の範囲（1)項記載のスクロール式流体機械。

3．発明の詳細な説明

〔産業上の利用分野〕

本発明は、例えば空気等を圧縮したり、或いは機器内を真空にしたりするのに用いて好適な無給油型のスクロール式流体機械に関する。

〔従来の技術〕

一般に、スクロール式流体機械はケーシングと、該ケーシングに設けられた固定スクロールと、前記ケーシングに回転自在に設けられた駆動軸と、該駆動軸のクランク軸に旋回軸受を介して回転自在に設けられ、前記固定スクロールに対して偏心して回転する旋回スクロールと、該旋回スクロールの鏡板と前記ケーシングとの間に設けられたスラストすべり軸受とから大略構成されている。

そして、該スクロール式流体機械を空気を圧縮

するスクロール圧縮機として用いる場合は、駆動軸を回転して旋回スクロールを公転させ、吸込口から吸込んだ空気を固定スクロールと旋回スクロールとの間に形成される圧縮室内に密封し、旋回スクロールが公転しながら徐々に圧縮室を縮小して空気を圧縮した後、固定スクロールの中心部に設けられた吐出口から圧縮空気を吐出するようになっている。

（発明が解決しようとする問題点）

所で、前述した空気圧縮時には、旋回スクロールは圧縮熱によって高温になるが、スラストすべり軸受は高温の旋回スクロールと直接に摺接した状態で、圧縮室内で発生した空圧力により旋回スクロールに掛るスラスト方向の荷重を受承するものであるため、スラストすべり軸受には耐熱性、耐摩耗性、摺動性に優れた長寿命のものであることが望まれている。

このため、例えば金属製基材の表面にポリイミド樹脂と四フッ化エチレン樹脂を主成分とする合成樹脂被膜（フロンメタル）を旋回スクロール及びスラストすべり軸受の両方にコーティングしてすべり軸受の長寿命化を図ったもの、或いは旋回スクロールの鏡板を炭素鋼で成形して熱処理により硬化させると共に、スラストすべり軸受をポリフェニレンサルファイド（ＰＰＳ）で成型したものが知られている。

しかしながら、旋回スクロールとすべり軸受の両方にフロンメタルのコーティングを施した第１の従来技術のものは、フロンメタルの摩耗と共に金属製基材のかじり現象が起るという欠点がある。また、旋回スクロールを炭素鋼で成形し、すべり軸受をポリフェニレンサルファイドで成型した第２の従来技術のものは、すべり軸受の耐摩耗性が劣るという欠点がある。

本発明は上述した従来技術の欠点に鑑みなされたもので、高温状態で旋回スクロールと摺接しつつスラスト方向の荷重を受承するスラストすべり軸受を長寿命化できるようにしたスクロール式流体機械を提供することを目的とする。

（問題点を解決するための手段）

上述した問題点を解決するために構成された本発明の手段の特徴は、旋回スクロール及びスラストすべり軸受のいずれか一方をアルミニウム材により形成すると共に、他方を高機能性エンジニアリングプラスチックにより形成し、かつ、アルミニウム材により形成した該旋回スクロール又はスラストすべり軸受の摺接面には硬化処理により酸化被膜を形成したことにある。

（実施例）

以下、本発明の一実施例をスクロール圧縮機を例に挙げて図面に基づき詳述する。

第１図において、１はケーシングで、該ケーシング１は小径筒状の軸受部１Ａと、大径筒部１Ｂとからなり、該大径筒部１Ｂの内周側には後述するスラスト軸受１７を固定する軸受固定部１Ｃが環状に突出形成されている。

２は前記ケーシング１の大径筒部１Ｂ端面に固着された固定スクロールで、該固定スクロール２は鏡板２Ａと該鏡板２Ａの内側面に立設されたうず巻状ラップ部２Ｂと、該ラップ部２Ｂの外側に位置して鏡板２Ａの外周縁に形成された円筒部２Ｃとから構成されており、該鏡板２Ａの外側面には複数の放熱フィン３，３，…が突設されている。

４は前記固定スクロール２と同一軸線O_1-O_1に位置してケーシング１に設けられた駆動軸で、該駆動軸４は軸受部１Ａにラジアル玉軸受５，５を介して回転自在に支持されている。そして、該駆動軸４の一端はケーシング１外に突出してモータ（図示せず）に接続され、その他端側は大径筒部１Ｂ内に位置してカウンタウエイト取付部４Ａになっている。更に、該カウンタウエイト取付部４Ａの先端側はクランク軸４Ｂになっており、該クランク軸４Ｂの軸線O_2-O_2は駆動軸４の軸線O_1-O_1に対して距離δだけ偏心している。

６は旋回軸受７を介して前記クランク軸４Ｂに回動自在に嵌装されたボス部材で、該ボス部材６は旋回軸受７の外輪側に嵌合する有底の円筒部６Ａと、該円筒部６Ａの底壁側の端面に軸線

O_2-O_2上に位置して小径に形成された嵌合突部６Ｂと、該嵌合突部６Ｂと円筒部６Ａとの間に位置して径方向に突設されたフランジ６Ｃと、該フランジ６Ｃに穿設された複数のボルト挿通孔６Ｄ，６Ｄ，…とから構成されている。

８はアルミニウム材により形成された旋回スクロールを示す。９は該旋回スクロール８の鏡板で、該鏡板９の一側には小径凹部１０Ａと、該小径凹部１０Ａの外周に位置してボス部材６のフランジ６Ｃより大径に形成された凹状段部１０Ｂとからなる嵌合凹部１０が設けられており、該嵌合凹部１０の中心は旋回軸受７の軸線O_2-O_2上に位置している。このように、該嵌合凹部１０が形成されることによって該鏡板９の一側には、後述するすべり軸受１７が摺接する円環状の摺接面９Ａが形成されており、該摺接面９Ａには酸化被膜を形成する硬化処理、いわゆるアルマイト処理が施されている。そして、該摺接面９Ａには更にラッピングが施こされ、表面粗さ及び平面度共に高精度に加工されている。

圧縮室１２と連通するように鏡板２Ａの中心に穿設されていろ。更に、１６は前記旋回スクロール８の自転運動を防止する自転防止機構としての補助クランクで、該補助クランク１６は旋回スクロール８と固定スクロール２との間に位置して周方向に所定間隔で複数配設されている。

次に、１７はケーシング１の軸受固定部１Ｃと旋回スクロール８の鏡板９との間に複数個介装されたスラストすべり軸受で、該各すべり軸受１７は圧縮室１２内で発生した空圧力により旋回スクロール８に掛るスラスト方向の荷重を受承するようになっている。ここで、該すべり軸受１７は耐熱性を有し、また、高負荷下での耐摩耗性、摺動性に優れた高機能性エンジニアリングプラスチックによって成型されており、特に、ポリエーテルエーテルケトン（ＰＥＥＫ）或いはポリエーテルサルフォン（ＰＥＳ）が用いられている。

上述した高機能性エンジニアリングプラスチックからなるすべり軸受１７は大径の基部１７Ａと小径の軸受部１７Ｂからなる断面略凸状に成型されており、軸受固定部１Ｃに周方向に離間して凹設した複数の嵌着穴１８，１８，…内に基部１７Ａを嵌入した状態で軸受固定部１Ｃに耐熱性接着剤により固着されている。

なお、図中１９は径方向一側の端にカウンタウエイト２０が設けられた冷却ファンで、該冷却ファン１９は駆動軸４のカウンタウエイト取付部４Ａに固着されている。また、２１，２１，…はケーシング１の大径筒部１Ｂ頂面に軸方向に穿設された複数の吸気通路、２２，２２，…は該大径筒部１Ｂの軸方向他端側に位置して径方向に穿設された複数の排気通路で、前記冷却ファン１９が回転することにより各吸気通路２１を介してケーシング１内に流入した冷気は旋回軸受７、旋回スクロール８を冷却した後、各排気通路２２から外部に排出される。

本実施例は上述の如く構成されており、旋回スクロール８を旋回して空気を圧縮する作動自体については、前述した従来技術と実質的な差異は

一方、１１は前記鏡板９の他側面に突設されたうず巻状ラップ部で、該ラップ部１１を固定スクロール２のラップ部２Ｂと所定角度ずらせて重なり合せることにより、固定スクロール２と旋回スクロール８との間には複数の圧縮室１２，１２が形成されるようになっている。かくして、本実施例による旋回スクロール８は鏡板９と、該鏡板９の一側面に凹設された嵌合凹部１０と、鏡板９の他側面に突設されたうず巻状ラップ部１１とから構成されている。そして、該旋回スクロール８はボス部材６に締付けボルト１３，１３，…によって締着され、クランク軸４Ｂの軸線O_2-O_2と同一軸線を有して該クランク軸４Ｂに回転自在になっており、該旋回スクロール８が旋回すると各ラップ部２Ｂ，１１間に形成された圧縮室１２は連続的に縮小するようになっている。１４は吸込ポート、１５は吐出ポートを示し、吸込ポート１４は最外周側の圧縮室１２と連通するように固定スクロール２の円筒部２Ｃに穿設され、吐出ポート１５は最中心側の

ないので、その説明は省略する。

而して、本実施例によれば、旋回スクロール８はアルミニウム材で成形して軽量化を図ったから、圧縮室内の空圧力を介して各すべり軸受１７に掛る旋回スクロール８の荷重を軽減できる。この結果、該すべり軸受１７の摩耗量を減少して長寿命化を実現できるし、駆動軸４に掛る負荷も軽減できるから、旋回軸受７及びラジアル玉軸受５の長寿命化も実現できる。

更に、旋回スクロール８の鏡板９のうち、各すべり軸受１７と摺接する摺接面９Ａには緻密で硬度性のある酸化被膜による硬化処理を施し、更にラッピングによって表面粗さと平面度の面精度を高めてあるから、すべり軸受１７に対する摺動性は大幅に向上され、すべり軸受１７の長寿命化を図ることができる。

一方、スラストすべり軸受１７は耐熱性、高負荷下での耐摩耗性、摺動性に優れた高機能性エンジニアリングプラスチックのうち、特にポリエーテルエーテルケトン（ＰＥＥＫ）又はポリエーテルサルフォン（ＰＥＳ）で成型してある。従って、該すべり軸受１７は摺接面９Ａに酸化被膜を形成してあるアルミニウム製の旋回スクロール８に対する摺動性が極めて優れており、他の高機能性エンジニアリングプラスチックに比較して摩耗量を大幅に減少することができ、スラストすべり軸受１７は長寿命化を実現できる。

第２図に、各種の高機能性エンジニアリングプラスチックと摺接面に酸化被膜を形成したアルミニウム製の円盤状回転体とを組合せて実施した摩耗試験の結果を示す。試験材料には、前述したポリエーテルエーテルケトン（ＰＥＥＫ）、ポリエーテルサルフォン（ＰＥＳ）の他、ポリフェニレンサルファイド（ＰＰＳ）、四フッ化エチレン（ＰＴＦＥ）、ポリイミド（ＰＩ）、ポリスチリルピリジン（ＰＳＰ）及びポリアミドイミド（ＰＡＩ）を用いた。また、荷重は実機の約４倍、回転体の終速は実機相当である。

同図から明らかなように、ポリエーテルエーテルケトン（ＰＥＥＫ）及びポリエーテルサルフォン（ＰＥＳ）の摩耗量は他のエンジニアリングプラスチックに比較して約 $1/2$ ～ $1/6$ であり、高負荷下での耐摩耗性が極めて優れていることを示している。

なお、本実施例では複数個のスラストすべり軸受１７をケーシング１の軸受固定部１Ｃに周方向に隔設するものとして述べたが、スラストすべり軸受を円環状のシート体に形成して旋回スクロールの摺接面９Ａを全面で受承するように構成してもよく、このようにすることにより、スラストすべり軸受に掛る単位面積当りの荷重を小さくでき、長寿命化を図ることができる。

また、実施例では、旋回スクロール８をアルミニウム材により形成し、スラストすべり軸受１７を高機能性エンジニアリングプラスチックで成型するものとして述べたが、これとは逆に旋回スクロール８を高機能性エンジニアリングプラスチックで成型し、スラストすべり軸受１７をアルミニウム材で形成すると共に、該すべり軸受17の摺接面に酸化被膜を形成してもよいものである。

（発明の効果）

本発明は以上詳述した如く構成したから、下記の諸効果を奏する。

①旋回スクロールをアルミニウム材又は高機能性エンジニアリングプラスチックで成形することによって軽量化し、スラストすべり軸受に掛る荷重を軽減したから、該すべり軸受の摩耗量を少なくすることができ、軸受を長寿命化できる。

②上記①の如く旋回スクロールは軽量化したから、駆動軸に掛る荷重を減少できる結果、旋回軸受やラジアル玉軸受の長寿命化も図ることができる。

③旋回スクロール及びスラストすべり軸受の一方をアルミニウム材で成形すると共に、摺接面には酸化被膜を形成し、旋回スクロールとスラストすべり軸受の摺動性を高めたから、該すべり軸受の耐摩耗性が向上するし、かじり現象等の発生を防止でき、スクロール式流体機械の信頼性を向上できる。

4．図面の簡単な説明

第１図は本発明の実施例に係るスクロール圧縮機の縦断面図、第２図は実施例で用いるポリエーテルエーテルケトン（ＰＥＥＫ）及びポリエーテルサルフォン（ＰＥＳ）と他の高機能性エンジニアリングプラスチックの摩耗特性を比較して示す線図である。

１…ケーシング、２…固定スクロール、４…駆動軸、４Ｂ…クランク軸、７…旋回軸受、８…旋回スクロール、１７…スラストすべり軸受。

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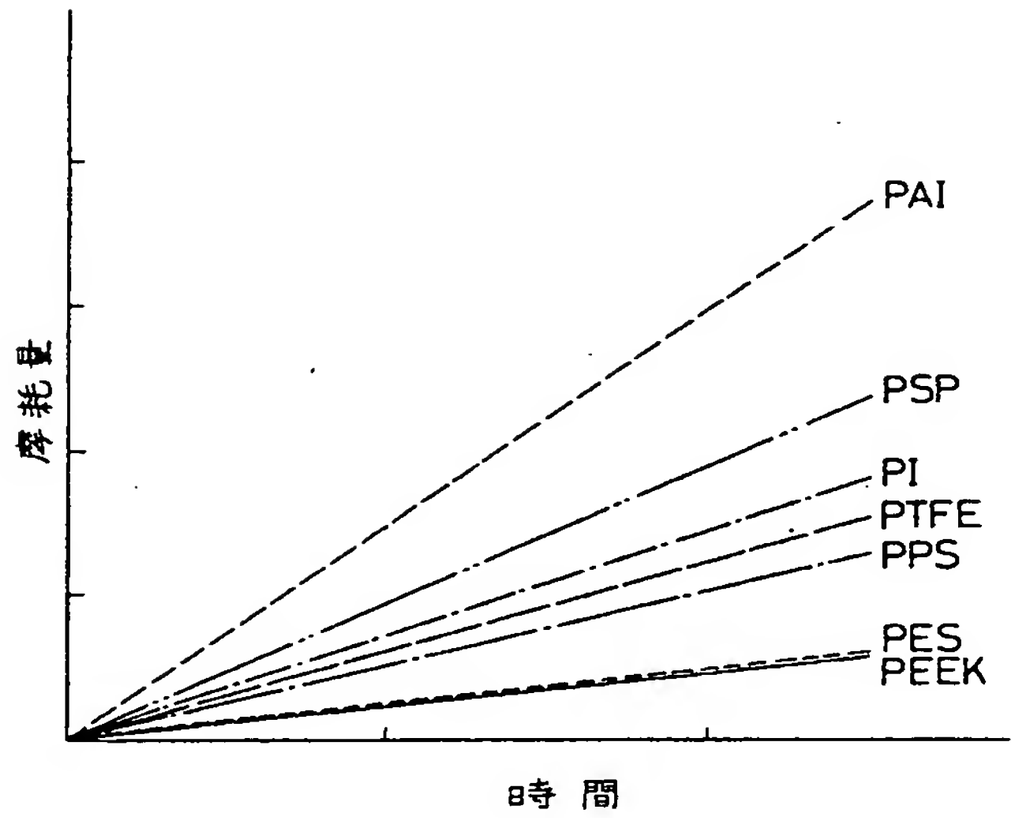
第２図



第１図